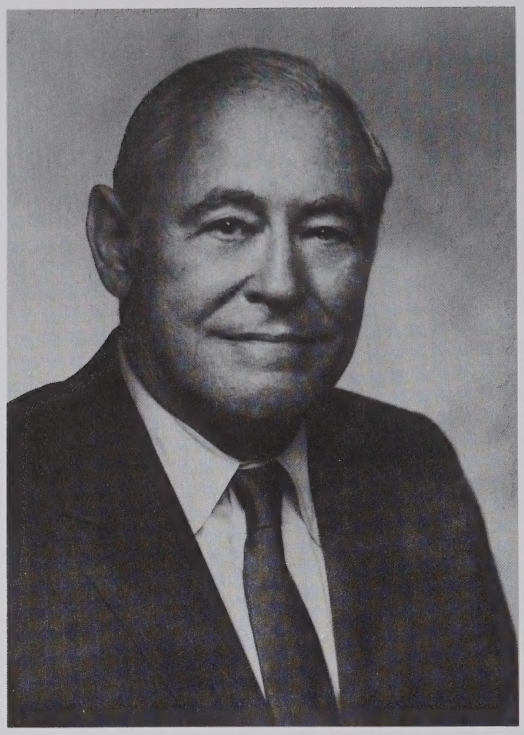
MICROWAVE COMPONENT AND INSTRUMENT CATALOG



BRUNO O. WEINSCHEL
CHIEF ENGINEER

1939, BA Physics, Technische Hochschule, Stuttgart, Germany; 1966, Dr. Engineering, Technische Hochschule, Munich, Germany; 1984, Dr. Science (Honorary), Capitol Institute of Technology. Registered professional engineer, MD, DC.

1943-1944, Supervisory Engineer of Electrical Test Planning, Bell System; 1944-1948, Chief Engineer, Industrial Instruments, Jersey City; 1949-1952, Section Chief, National Bureau of Standards; 1952-1986, Chief Engineer, Weinschel Engineering Co., Inc.; 1986-Present, Chief Engineer, Weinschel Associates.

Author/co-author of over 52 journal articles, inventor/co-inventor of 20 patents. Coeditor for 2 special issues of the IEEE Proceedings, June 1967, January 1986, on "Radio Measurement Methods and Standards". Contributor to 1987 IEEE Book on "Engineering Excellence".

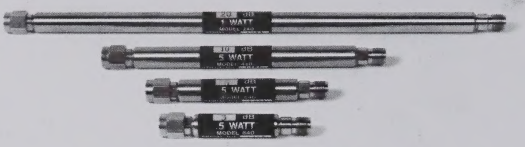
1985, William A. Wildhack Award, NCSL, "for contributions to the field of metrology"; 1992, IEEE Richard M. Emberson Award, "for distinguished leadership in the Institute's technical, professional, educational, standards and publishing activities".

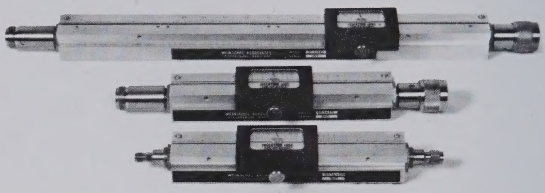
1966, Fellow of IEEE, "for contributions in the field of precision microwave measurements and advancement of attenuation measurements"; 1977, Fellow, IEE, London; 1967-1970, Chairman, U.S. URSI Commission I on Radio Measurements; 1976-1978, Chairman, Executive Committee, Conference for Precision Electromagnetic Measurements; 1980-1981, Chairman, Engineering Affairs Council, AAES; 1982, Secretary, Committee SC-46D, International Electrotechnical Commission on Coaxial Connectors; 1983-1984, AAES Principal Investigator for NSF/DOD Study on "Engineering Utilization"; Member, IEEE Standards Committee on Precision Coaxial Connectors; 1978-1979, IEEE Vice President for Professional Activities; 1980 IEEE Secretary; 1986 IEEE President; 1986-1987, Member, President Reagan's Committee, National Medal of Science.

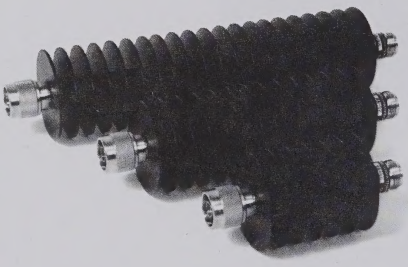
EXPERIENCE
AND
INNOVATION
COMBINED
TO PROVIDE A
BETTER PRODUCT

Weinschel Engineering, founded by Dr. Weinschel in 1952, was sold in 1986. Weinschel Associates in Gaithersburg, Maryland, with the support of some of former key technical staff of Weinschel Engineering, has improved the function and extended the frequency range of many products which are now being manufactured by Weinschel Associates.

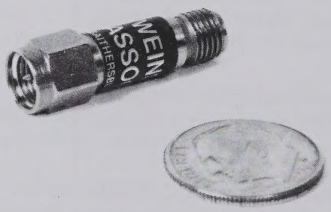
The Weinschel Associates model numbers are functionally equivalent or superior to the former Weinschel Engineering model numbers, especially for the identical national stock number of the Defense Logistic Agency.

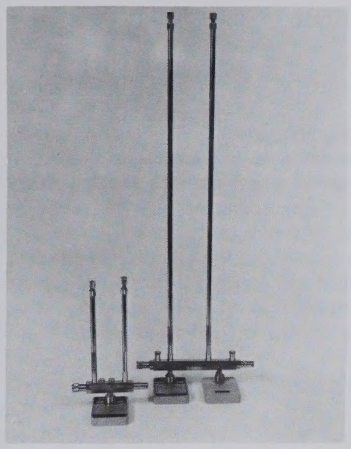

1 WATT
5 WATT
5 WATT
5 WATT

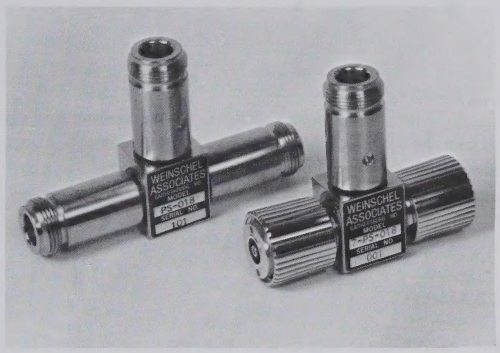


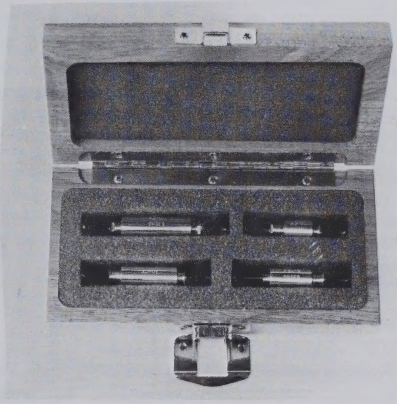


ATTENUATION DB
10
20
30
40
50
60
70
80
90
100

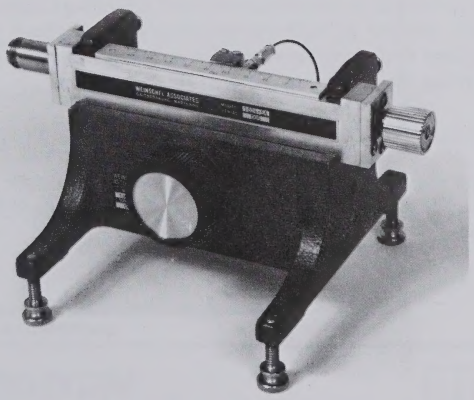

WEIN
SSO




WEINSCHEL ASSOCIATES
WEINSCHEL ASSOCIATES



30MHz STANDARD
PISTON ATTENUATOR
MODEL SPA-2
ATTENUATOR
ADJUSTMENTS
12 1999
dB
COARSE
FINE
INPUT
OUTPUT
POWER



ORDERING INFORMATION

How to Order

When placing an order, please use both model number and description (e.g. Model PS-018 Power Splitter). If there are any special features or modifications desired, please contact factory. We are a specialty house and will do our best to serve you, the customer.

Where to Order

Address all purchase orders and other communications to:

Weinschel Associates
42 Cessna Court
Gaithersburg, MD 20879

or contact your nearest Weinschel Associates Representative. A complete listing of our Sales Representatives is listed in the back of this catalog.

You may order by telephone, mail or fax. Prices, terms and conditions of sales and final acceptance will be made at our main office listed above.

Domestic Terms

Quotations remain effective for 60 days. Terms are net 30 days for established customers and new accounts upon credit approval. If credit is not established, payment must be received prior to shipment or shipment may be made COD to minimize delays. All prices are F.O.B. Gaithersburg, Maryland, for shipment within the continental United States.

Export Terms

Payment terms are cash-in-advance or Confirming Letter of Credit payable at sight by the First National Bank of Maryland against presentation of our draft and documents. All prices are F.O.B. Gaithersburg, Maryland.

Source Inspection

When Government or Commercial Source Inspection is required, please add $125.00 to the total purchase order value.

In Warranty Repairs

In the event of a problem with an item, please contact the factory. Many problems can be solved by telephone assistance. If return of the item is necessary, we will then give a return authorization number by which your item will be identified and repaired. Please give complete details of your complaint along with complete company name, telephone number and point of contact.

Out of Warranty Repair

If return of an item for repair and/or calibration, please follow the procedure in the above paragraph pertaining to return authorization number. Upon receipt of your item, an evaluation will be done and you will be notified of our findings including price to repair or recalibrate. Repair or recalibration will begin upon your authorization to proceed in the form of a purchase order. Weinschel Associates reactivates a full warranty on all repaired items for a period of 90 days.

Shipping Instructions

Weinschel Associates will use best judgment and best method shipping for your items. Special instructions will be followed upon request at a reasonable charge.

Specification Changes

Changes to specifications may occur at any time without notification and without any obligation to Weinschel Associates to revise previously sold items. We reserve the right to discontinue any item without notice.

Cancellations and Returns

Weinschel Associates must give authorization to cancel an order. If the event authorization is given, there may still be some charge as determined by Weinschel Associates. All returns are subject to a restocking charge up to the full sell price dependent upon elapsed time.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

WARRANTY
BY
WEINSCHEL ASSOCIATES

WEINSCHEL ASSOCIATES warrants each product that it manufactures to be free from defects in materials and workmanship. WEINSCHEL ASSOCIATES' only obligation under this warranty is, at its option, to repair or replace at its plant any product or part thereof (except tubes, transistors, fuses, batteries, radio frequency diodes and detectors, and thermocouple, thermistor and bolometer elements) that is returned with transportation charges prepaid to WEINSCHEL ASSOCIATES by the original purchaser within one year after delivery to the original purchaser and which, upon examination by WEINSCHEL ASSOCIATES, is determined by it to be defective or to have failed in normal service. All warranty returns must first be authorized in writing by WEINSCHEL ASSOCIATES.

THE ABOVE WARRANTY IS WEINSCHEL ASSOCIATES' SOLE WARRANTY, AND THE EXTENT OF ITS LIABILITIES AND OBLIGATIONS, WITH RESPECT TO ITS PRODUCTS UNLESS OTHER WARRANTIES, LIABILITIES OR OBLIGATIONS ARE EXPRESSLY AGREED TO IN WRITING BY WEINSCHEL ASSOCIATES. WEINSCHEL ASSOCIATES MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, AND DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL WEINSCHEL ASSOCIATES BY LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL LOSS OR DAMAGES, OR FOR ANY SUM GREATER THAN THE PURCHASE PRICE OF THE PRODUCT.

WEINSCHEL ASSOCIATES reserves the right to make changes in the design of its products at any time without incurring any obligation to make those changes on products that it has previously sold.

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SUMMARY TABLE ON FIXED ATTENUATORS

CONNECTORS	GHz	MODEL	ATTENUATION, dB	POWER		SPECIAL FEATURES	PAGE
				AVE. WATTS	KW PEAK		
N (M/F)	0-3	WA50	1-50	2 TO 1	1		27
	0.4-18	210B	1-20	5 TO 1	10 to 1		28
	0-12.4	WA1	1-60	5	1		8
	0-18	WA2	1-60	5	1		8
	0-18	WA44	1-60	5	1	LOW VSWR	12
	0-8	WA33	3, 6, 10, 20, 30	25	5	BD	15
	0-8	WA24	3, 6, 10, 20, 30, 40	50	5	BD	16
	0-18	WA46	3, 6	25	1	BD	17
	0-18	WA46	10, 20, 30, 40	25	1	UD	17
	0-18	WA47	10, 20, 30, 40	50	1	UD	18
	0-18	WA48	20, 30, 40	100	1	UD	19
SMA (M/F)	0-12.4	WA3	1-60	2	0.5		9
	0-18	WA4	1-60	2	0.5		9
	0-26.5	WA9	1-20	2	0.5		10
	0-18	WA41	1-30	10	1	BD	14
7mm	0-18	WA17	1-60	5	1	LOW VSWR	11
2.92mm (M/F)	2-40	240	3, 6, 10, 20	1	0.05		29
	4-40	440	3, 6, 10	0.5	0.05		29
	8-40	840	3, 6, 10, 20	0.5	0.05		29
	0-40	WA54	3, 6, 10, 20, 30	2	0.2		13

NOTES:

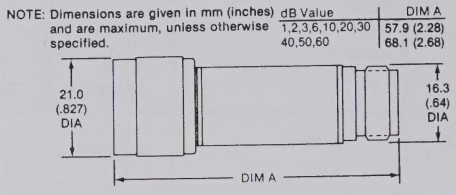
1. Add dB value to model number
   Example: WA1-3.5; this means 3.5 dB

2. BD = Bidirectional in power
   UD = Unidirectional in power

3. Other connectors: We invite your inquiry using HN, C, SC, BNC, TNC, 3.5/2.4/1.85mm, double male, double female, mixed connector types.

FIXED ATTENUATOR — MODEL WA1, WA2

DC-18 GHz — TYPE "N" — 5 WATTS



NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE:
Model WA1: DC to 12.4 GHz
Model WA2: DC to 18.0 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Values (dB)	Deviation(dB)	
	WA1	WA2
1	± 0.4	± 0.5
2	± 0.4	± 0.5
3	± 0.3	± 0.3
4 - 9	± 0.3	± 0.3
10	± 0.5	± 0.5
20	± 0.5	± 0.5
30	± 0.75	± 1.0
40	± 0.75	± 1.0
50	± 0.75	± 1.25
60	± 1.0	± 1.50

MAXIMUM VSWR:

Freq. Range (GHz)	VSWR	
	WA1	WA2
DC-4.0	1.15	1.15
4.0-8.0	1.20	1.20
8.0-12.4	1.25	1.25
12.4-18.0	–	1.40

POWER RATING: 5 watts average, 1 kW peak. (Maximum rated average power for all models to 25°C ambient temperature, derated linearly to 0 watts at 125°C.

CALIBRATION: At DC, 4.0, 8.0, 12.0 and 18.0 GHz.

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT:
< 0.0004 dB/dB x C°

TEMPERATURE RANGE: - 55°C to + 125°C

CONSTRUCTION: Passivated stainless steel body and connectors. Beryllium copper gold plated female contact.

WEIGHT:
1 thru 20, 30 dB: Net 0.07 kg (2.6 oz.); Shipping 0.45 kg. (1 lb.)
40, 50, 60 dB: Net 0.10 kg. (3.6 oz.); Shipping 0.45 kg. (1 lb.)

CONNECTORS: Weinschel Associates type "N" stainless steel outer bodies. Conforming to MIL-STD-348A.

Specifications subject to change without notice.

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42 Cessna Court (Airpark)
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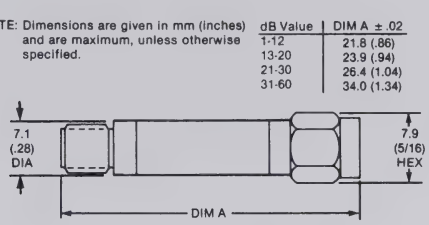
FIXED ATTENUATOR — MODEL WA3, WA4

DC-18 GHz — SMA — 2 WATTS


NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.
dB Value | DIM A ± .02
1-12 | 21.8 (.86)
13-20 | 23.9 (.94)
21-30 | 26.4 (1.04)
31-60 | 34.0 (1.34)
7.1 (.28) DIA
7.9 (5/16) HEX
DIM A

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE:
Model WA3: DC to 12.4 GHz
Model WA4: DC to 18.0 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Values (dB)	Deviation (dB)	
	WA3	WA4
1 - 6	± 0.3	± 0.3
7 - 12	± 0.3	± 0.5
20	± 0.5	± 0.7
30, 40	± 0.75	± 1.0
50, 60	± 1.0	± 1.5

MAXIMUM VSWR:

Frequency Range (GHz)	WA3	WA4
DC - 4.0	1.15	1.15
4.0 - 8.0	1.20	1.20
8.0 - 12.4	1.25	1.25
12.4 - 18.0	N/A	1.35

CALIBRATION: At DC, 4.0, 8.0, 12.0 and 18.0 GHz.

POWER RATING: 2 watts average, 500 watts peak (maximum rated average power to 25°C ambient temperature, derated linearly to 1.25 watts at 75°C and 0.5 watt at 125°C).

TEMPERATURE COEFFICIENT:
< 0.0004 dB/dB x °C

TEMPERATURE RANGE:
- 55°C to + 125°C

POWER COEFFICIENT: < 0.005 dB/dB x W

CONNECTORS: SMA stainless steel. Controlled interface dimensions. One male and one female provided with standard unit.

CONSTRUCTION: Passivated stainless steel body and connectors. Beryllium copper gold plated female contact.

WEIGHT:
1 thru 12 dB: Net 3.9 gm (0.14 oz.)
13 thru 20 dB: Net 4.3 gm (0.15 oz.)
21 thru 30 dB: Net 4.9 gm (0.17 oz.)
31 thru 60 dB: Net 6.5 gm (0.23 oz.)
Shipping Weight: 0.45 kg (1 lb.)

Specifications subject to change without notice.

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42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
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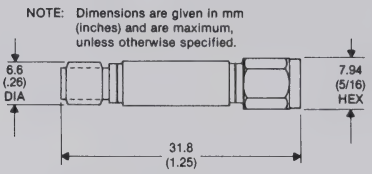
FIXED ATTENUATOR — MODEL WA9

DC-26.5 GHz — SMA — 2 WATTS



NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 26.5 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Value (dB)	Deviation (dB)
3	± 0.5
6	± 0.6
10	± 0.8
20	± 1.0

MAXIMUM VSWR:

Frequency Range (GHz)	VSWR
DC - 4.0	1.10
4.0 - 8.0	1.15
8.0 - 12.4	1.20
12.4 - 18.0	1.25
18.0 - 26.5	1.35

TEMPERATURE RANGE: - 55°C to + 125°C

CALIBRATION: At DC, 4.0, 8.0, 18.0 and 26.5 GHz.

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

POWER RATING: 2 watts average, 500 watts peak. (Maximum rated power for all models to 25°C ambient temperature, derated linearly to 1 watt at 75°C and 0 watts at 125°C.)

CONNECTORS: SMA connectors per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connectors.

Specifications subject to change without notice.

WEINSCHEL ASSOCIATES

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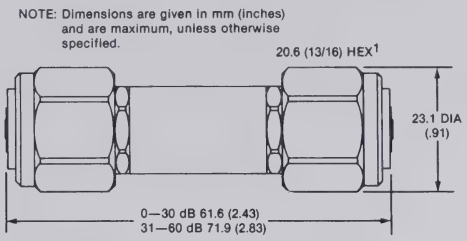
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

PRECISION FIXED ATTENUATOR — MODEL WA17

DC-18 GHz — 7 MM — 5 WATTS


NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.
20.6 (13/16) HEX[1]
23.1 DIA (.91)
0—30 dB 61.6 (2.43)
31—60 dB 71.9 (2.83)

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 18.0 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Value (dB)	Maximum Deviation (dB)
1	± 0.5
3	± 0.3
6	± 0.3
10	± 0.5
20	± 0.5
30	± 0.75
40	± 0.75
50	± 0.75
60	± 1.0

MAXIMUM VSWR:

DC - 4 GHz	4 - 12.4 GHz	12.4 - 18 GHz
1.10	1.15	1.20

POWER RATING: 5 watts average; 1 kW peak. (Maximum rated average power for all models to 25°C ambient temperature, derated linearly to: 4 watts at 45°C, 3 watts at 65°C, 2 watts at 85°C.)

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 50°C to + 85°C

CONSTRUCTION: Brass body, plated. Stainless steel and beryllium copper or silver alloy connectors (contacts).

CONNECTORS: Weinschel Associates Precision 7 mm connector meets or exceeds requirements of IEEE Standard 287 and mates with all connectors conforming to Design 2 of that standard.

COUPLING TORQUE: 14 ± 1 inch pounds

CALIBRATION: All units are swept tested for VSWR. 0 through 30 dB units are sweep tested for insertion loss. 31 through 60 dB are tested at DC, 4, 8, 12 and 18 GHz. A certificate of calibration is supplied with each unit. In addition, insertion loss values are marked on the units for DC, 4, 8, 12 and 18 GHz.

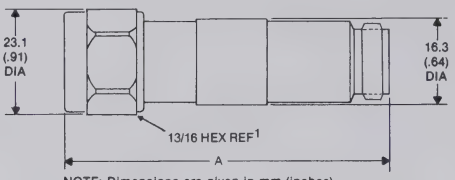
WEIGHT:
1-30 dB: Net 0.11 g (4.0 oz.); Shipping 0.45 kg (1 lb.)
31-60 dB: Net 0.14 kg (5.0 oz.); Shipping 0.45 kg (1 lb.)

Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

PRECISION FIXED ATTENUATOR — MODEL WA44

DC-18 GHz — PRECISION TYPE N — 5 WATTS



NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.

dB Value	DIM A[2]
0 — 30 dB	76.2 (3.0)
31 — 60 dB	86.4 (3.4)

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 18 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Value (dB)	Deviation (dB)
1	± 0.5
2, 3, 4, 5, 6, 7, 8, 9	± 0.3
10	± 0.5
20	± 0.5
30	± 1.0
40	± 1.0
50	± 1.25
60	± 1.5

VSWR:

DC - 4 GHz:	1.15
4.0 - 12.4 GHz:	1.20
12.4 - 18.0 GHz:	1.25

POWER RATING: 5 watts average; 1 kW peak. (Maximum rated average power for all models to 25°C ambient temperature, derated linearly to: 4 watts at 45°C, 3 watts at 65°C, 2 watts at 85°C).

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 50°C to + 85°C

CONSTRUCTION: Brass body, plated: stainless steel connectors; beryllium copper gold plated contacts.

CONNECTORS: Weinschel Associates Precision Type N mates with connectors conforming to MIL-C-39012 Lab Std Test Connector. Standard configuration is male/female.

COUPLING TORQUE: 14 ± 1 inch pounds

CALIBRATION: All units are sweep tested for VSWR. 1 through 30 dB units are sweep tested for insertion loss. 31 through 60 dB are tested at DC, 4, 8, 12 and 18 GHz. A certificate of calibration is supplied with each unit. In addition, insertion loss values are marked on the units for DC, 4, 8, 12 and 18 GHz.

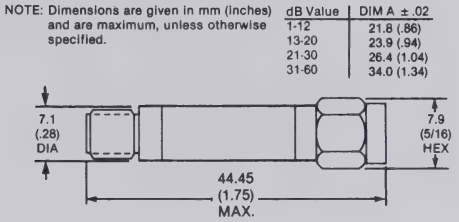
WEIGHT:
1-30 dB: Net 0.10 kg (3.5 oz.); Shipping 0.45 kg (1 lb.)
31-60 dB: Net 0.13 kg (4.5 oz.); Shipping 0.45 kg (1 lb.)

Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

FIXED ATTENUATOR — MODEL WA54

DC-40 GHz — 2.92 MM* — 2 WATTS


NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.
dB Value | DIM A ± .02
1-12 | 21.8 (.86)
13-20 | 23.9 (.94)
21-30 | 26.4 (1.04)
31-60 | 34.0 (1.34)
7.1 (.28) DIA
7.9 (5/16) HEX
44.45 (1.75) MAX.

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 40 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Value (dB)	Deviation		
	DC to 18 GHz	18 to 26.5 GHz	26.5 to 40 GHz
3	± 0.4	± 0.7	± 1.1
6	± 0.4	± 0.7	± 1.0
10	± 0.4	± 0.8	± 1.0
20	± 0.7	± 1.0	± 1.0
30	± 1.0	± 1.4	± 1.4

MAXIMUM VSWR:
DC - 26.5 GHz < 1.35:1
26.5 - 40 GHz < 1.60:1

POWER RATING: 2 watts average, 200 watts peak. (Maximum rated power for all models to 25°C ambient temperature, derated linearly to 0.1 watt at 125°C.)

POWER COEFFICIENT: < 0.01 dB/dB x W

TEMPERATURE COEFFICIENT:
< 0.001 dB/dB x °C

TEMPERATURE RANGE: - 55°C to + 125°C

CONNECTORS: 2.92 mm stainless steel. Controlled interface dimensions. One male and one female provided with standard unit.

CONSTRUCTION: Stainless steel connectors and passivated stainless steel body.

WEIGHT: Net 7.12 grams (0.29 oz.); Shipping 0.45 kg. (1 lb.)

* Mates with 3.5 mm (to 34 GHz) and SMA (to 26 GHz)

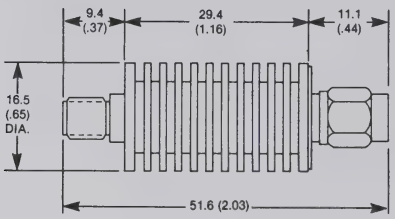
Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

MEDIUM POWER FIXED ATTENUATOR — MODEL WA41

DC-18 GHz — SMA — 10 WATTS

NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.



NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 18.0 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Value (dB)	Maximum Deviation (dB)
1, 2	± 0.5
3	± 0.3
6	± 0.3
10	± 0.5
20	± 0.7
30	± 1.0

MAXIMUM VSWR:

DC - 8.0 GHz:	1.20
8.0 - 12.4 GHz:	1.30
12.4 - 18.0 GHz:	1.35

POWER RATING (mounted in a horizontal plane): 10 watts average; 1 kW peak (maximum rated average power for all models to 25°C ambient temperature, derated linearly to 0 watts at 125°C).

CALIBRATION FREQUENCIES: DC, 4.0, 8.0, 12.0 and 18.0 GHz

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 55°C to + 125°C

CONNECTORS: SMA connectors per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connectors.

CONNECTOR OPTIONS:

No. Designation	Type/Description
1	SMA, Female
2	SMA, Male

CONSTRUCTION: Black, finned aluminum body. Passivated stainless steel connectors. Beryllium copper female contact.

WEIGHT: Net 0.028 kg (1 oz.); Shipping 0.45 kg (16 oz.)

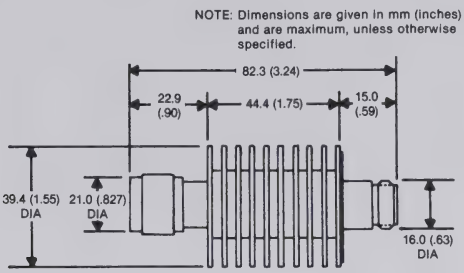
Specifications subject to change without notice.

WEINSCHEL ASSOCIATES

42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

MEDIUM POWER FIXED ATTENUATOR — MODEL WA33

DC-8 GHz — TYPE N — 25 WATTS



NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 8.0 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Value (dB)	Maximum Deviation (dB)	
	DC - 4 GHz	4 - 8 GHz
3	± 0.3	± 0.6
6	± 0.3	± 0.6
10	± 0.3	± 0.6
20	± 0.3	± 0.6
30	± 0.6	± 1.0

MAXIMUM VSWR:
DC - 4.0 GHz: 1.20
4.0 - 8.0 GHz: 1.30

POWER RATING (mounted in a horizontal plane): 25 watts average; 5 kW peak. (Maximum rated power for all models to 25°C ambient temperature, derated linearly to 0 watts at 125°C.)

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 55°C to + 125°C

CALIBRATION FREQUENCIES: DC, 4.0, and 8.0 GHz

CONNECTORS: Passivated stainless steel outer bodies with gold plated beryllium copper and stainless steel contacts to mate nondestructively with connectors per MIL-C-39012 and MIL-STD-348A.

CONNECTOR OPTIONS:

No. Designation	Type/Description
3	N, Female
4	N, Male

CONSTRUCTION: Black, finned aluminum body. Passivated stainless steel connectors. Beryllium copper female contact.

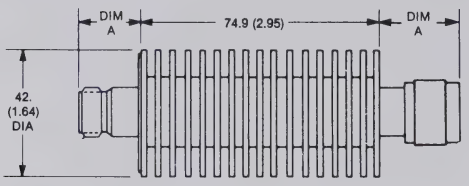
WEIGHT: Net 0.17 kg (6 oz.); Shipping 0.50 kg (18 oz.)

Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

HIGH POWER FIXED ATTENUATOR — MODEL WA24

DC-8 GHz — TYPE N — 50 WATTS



CONNECTOR	DIM A
Type N Male	22.9 (.90)
Type N Female	15.0 (.59)

NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 8.0 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Values (dB)	Maximum Deviation (dB)	
	DC - 4 GHz	4 - 8 GHz
3	± 0.4	± 0.75
6	± 0.4	± 0.75
10	± 0.4	± 0.75
20	± 0.4	± 0.75
30	± 0.4	± 0.75
40	± 0.4	± 0.75

MAXIMUM VSWR:
DC - 4.0 GHz: 1.20
4.0 - 8.0 GHz: 1.30

CALIBRATION FREQUENCIES: DC, 4.0 and 8.0 GHz

POWER RATING (mounted in a horizontal plane): 3, 6, and 10 dB values are bidirectional, 50 watts average, 5 KW peak (5 microseceond pulse width), .5% duty cycle can be applied to either port; 20, 30, and 40 dB values are unidirectional. 20 watts average only can be applied to the output connector. Maximum rated power to 25°C ambient temperature, derated linearly to 0 watts at 125°C).

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT:
< 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 55°C to + 125°C

CONSTRUCTION: Black, finned aluminum body. Passivated stainless steel connectors. Beryllium copper female contact.

CONNECTORS: Passivated stainless steel outer bodies with gold plated beryllium copper and stainless steel contacts manufactured per MIL-C-39012.

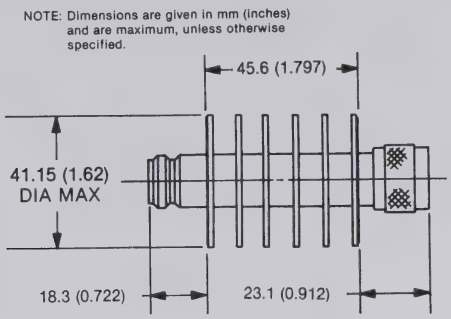
WEIGHT: Net 28 kg (10 oz.); Shipping 67 kg (24 oz.)

Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

MEDIUM POWER FIXED ATTENUATOR — MODEL WA46

DC-18 GHz — TYPE N — 25 WATTS


NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.
45.6 (1.797)
41.15 (1.62) DIA MAX
18.3 (0.722)
23.1 (0.912)

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 18 GHz

STANDARD NOMINAL VALUES:

Standard Nominal Values (dB)	Maximum Deviation (dB) from Nominal
3	± 0.5
6	± 0.5
10	± 0.5
20	± 0.75
30	± 1.0
40	

MAXIMUM VSWR:

Frequency Range (GHz)	VSWR
DC - 8	1.20
8 - 12.4	1.25
12.4 - 18.0	1.35

CALIBRATION FREQUENCIES: DC, 4, 8,12nd 18 GHz.

CALIBRATION DATA SUPPLIED: Insertion loss data supplied on calibration form.

POWER RATING (mounted in a horizontal plane): 25 watts average, 1 KW peak (5 microsecond pulse width), 1.25% duty cycle. 3 and 6 are bidirectional, 10 to 40 are unidirectional, 10 watts average and 250 watts peak can be applied to output. Maximum rated power to 25°C ambient temperature, derated linearly to 10% of rated power at 125°C.

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 55°C to + 125°C

CONSTRUCTION: Black, finned aluminum body. Passivated stainless steel connectors. Beryllium copper female contact. Manufactured per MIL-C-39012.

WEIGHT: Net 0.105 kg (4 oz.); Shipping 0.9 kg (2 lbs.)

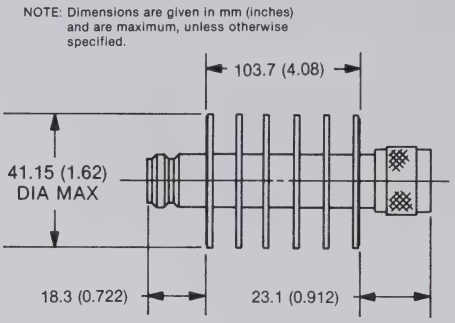
Specifications subject to change without notice.

WEINSCHEL ASSOCIATES

42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

HIGH POWER FIXED ATTENUATOR — MODEL WA47

DC-18 GHz — TYPE N — 50 WATTS


NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.
103.7 (4.08)
41.15 (1.62) DIA MAX
18.3 (0.722)
23.1 (0.912)

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 18 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Values (dB)	Maximum Deviation (dB)
10	± 0.5
20	± 0.75
30	± 1.0
40	± 1.0

MAXIMUM VSWR:

Frequency Range (GHz)	VSWR
DC - 8	1.20
8 - 12.4	1.25
12.4 - 18.0	1.35

CALIBRATION FREQUENCIES: DC, 4, 8, 12 and 18 GHz.

CALIBRATION DATA SUPPLIED: Insertion loss data supplied on calibration form.

POWER RATING (mounted in a horizontal plane): 50 watts average, 1 KW peak (5 microsecond pulse width), 2.5% duty cycle. Unit is unidirectional, 10 watts average and 250 watts peak can be applied to output. Maximum rated power to 25°C ambient temperature, derated linearly to 10% of rated power at 125°C.

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 55°C to + 125°C

CONSTRUCTION: Black, finned aluminum body. Passivated stainless steel connectors. Beryllium copper female contact. Manufactured per MIL-C-39012.

WEIGHT: Net 0.175 kg (6 oz.); Shipping 0.9 kg (2 lbs.)

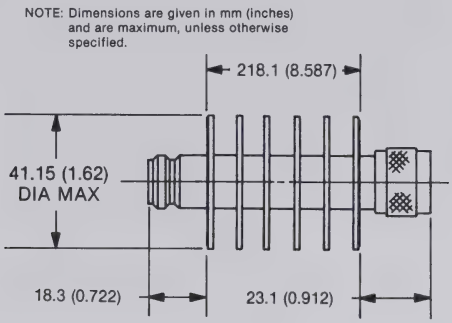
Specifications subject to change without notice.

WEINSCHEL ASSOCIATES

42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

HIGH POWER FIXED ATTENUATOR — MODEL WA48

DC-18 GHz — TYPE N — 100 WATTS


NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.
218.1 (8.587)
41.15 (1.62) DIA MAX
18.3 (0.722)
23.1 (0.912)

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 18 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Values (dB)	Maximum Deviation (dB)
20	± 0.75
30	± 1.0
40	± 1.0

MAXIMUM VSWR:

Frequency Range (GHz)	VSWR
DC - 8	1.25
8 - 12.4	1.35
12.4 - 18.0	1.45

CALIBRATION FREQUENCIES: DC, 4, 8, 12 and 18 GHz.

CALIBRATION DATA SUPPLIED: Insertion loss data supplied on calibration form.

POWER RATING (mounted in a horizontal plane): 100 watts average, 1KW peak (5 microsecond pulse width), 5% duty cycle. Unit is unidirectional, 10 watts average and 250 watts peak can be applied to output port. Maximum rated power to 25°C ambient temperature, derated linearly to 10% of rated power at 125°C.

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 55°C to + 125°C

CONSTRUCTION: Black, finned aluminum body. Passivated stainless steel connectors. Beryllium copper female contact. Manufactured per MIL-C-39012.

WEIGHT: Net 0.32 kg (11 oz.); Shipping 1.4 kg (3 lbs.)

Specifications subject to change without notice.

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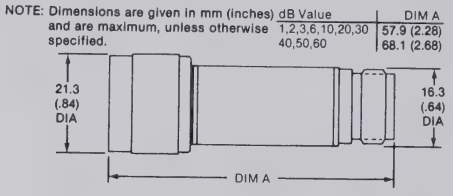
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

ATTENUATOR SET — MODEL WAS6

DC-18 GHz — TYPE N — 5 WATTS



ATTENUATOR SET: Four Model WA2 Attenuators: 3, 6, 10, 20 dB

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 18.0 GHz

STANDARD NOMINAL VALUES: 3, 6, 10 and 20 dB, each set.

MAXIMUM DEVIATION FROM NOMINAL VALUE (including frequency sensitivity):
3, 6 dB: ± 0.3 dB
10, 20 dB: ± 0.5 dB

MAXIMUM VSWR:

DC to 4.0 GHz:	1.15
4.0 to 8.0 GHz:	1.20
8.0 to 12.4 GHz:	1.25
12.4 to 18.0 GHz:	1.40

POWER RATING: 5 watts average, 1 kW peak. (Maximum rated average power to 25°C ambient temperature, derated linearly to 0 watts at 125°C).

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 55°C to + 125°C

CALIBRATION DATA: The Model WAS6 is furnished with a plastic laminated Certificate of Calibration in the lid of the case. The following data for each attenuator are provided:

3 DC resistance values and insertion loss ever 1.0 GHz from DC through 18.0 GHz

CASE DIMENSIONS: 4-3/4 in. (120.6 mm) long x 4-1/2 in. (114.3 mm) wide x 2-3/4 in. (44.5 mm) high.

WEIGHT: Net 1 lb., 13 oz. (0.82 kg); Shipping 3 lbs. (1.36 kg)

CONNECTORS: Stainless steel Type N, male and female each attenuator. Connectors mate nondestructively with Type N per MIL-C-39012 and MIL-C-71.

CONSTRUCTION: Passivated stainless steel body and connectors. Beryllium copper female contact.

Specifications subject to change without notice.

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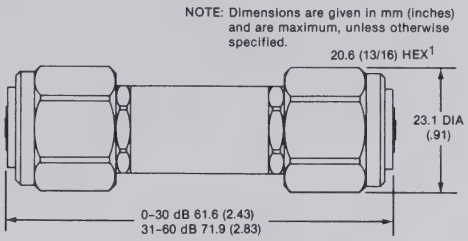
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

PRECISION ATTENUATOR SET — MODEL WAS16

DC-18 GHz — 7 MM — 5 WATTS


NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.
20.6 (13/16) HEX[1]
23.1 DIA (.91)
0-30 dB 61.6 (2.43)
31-60 dB 71.9 (2.83)

NOMINAL IMPEDANCE: 50 ohms

VSWR:
DC to 4.0 GHz: 1.10
4.0 to 12.4 GHz: 1.15
12.4 to 18.0 GHz: 1.20

STANDARD NOMINAL VALUES INCLUDED IN SET: 1, 3, 6, 10, 20, 30 dB

Standard Nominal Value (dB)	Deviation from Nominal*
1	± 0.5
3	± 0.3
6	± 0.3
10	± 0.5
20	± 0.5
30	± 0.75

POWER RATING: 5 watts average, 1 kW peak at 25°C, derated linearly to 2 watts at + 85°C.

TEMPERATURE COEFFICIENT:
< 0.0004 dB/dB x °C

* including frequency sensitivity

TEMPERATURE RANGE: - 50°C to + 85°C

CALIBRATION: All units are swept tested for insertion loss and VSWR. A calibration certificate with the test results is provided with each unit.

CONNECTORS: Precision 7 mm connector meets or exceed requirements of IEEE Standard 287 and mates with all connectors conforming to Design 2 of that standard.

CONSTRUCTION: Plated brass body with silver alloy outer contact and plated beryllium copper inner contact.

CASE DIMENSIONS: 10-5/8 in. (269.9 mm) long x 8 in. (203.2 mm) wide x 2-3/8 in. (60.3 mm) high.

WEIGHT: Net 3 lbs. 13 oz. (1.73 kg); Shipping 5 lbs. (2.56 kg)

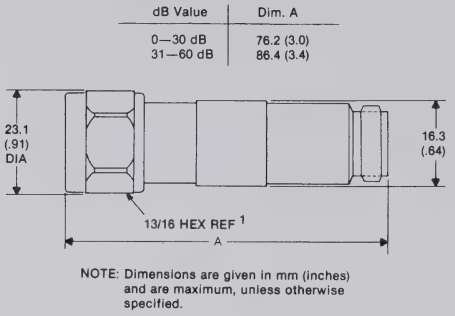
Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

08/92

PRECISION ATTENUATOR SET — MODEL WAS18

DC-18 GHz — TYPE N — 5 WATTS



NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.

NOMINAL IMPEDANCE: 50 ohms

VSWR:

DC - 4 GHz:	1.15
4 - 12.4 GHz:	1.20
12.4 - 18.0 GHz:	1.25

STANDARD NOMINAL VALUES INCLUDED IN SET: 1, 3, 6, 10, 20, 30 dB

Standard Nominal Value (dB)	Deviation from Nominal*
1	± 0.5
3	± 0.3
6	± 0.3
10	± 0.5
20	± 0.5
30	

POWER RATING: 5 watts average, 1 kW peak at 25°C, derated linearly to 2 watts at + 85°C.

TEMPERATURE COEFFICIENT:
< 0.0004 dB/dB x °C

* including frequency sensitivity

TEMPERATURE RANGE: - 50°C to + 85°C

CALIBRATION: All units are sweep tested for insertion loss and VSWR. A calibration certificate with the test results is provided with each unit.

CONNECTORS: Type N connectors conform to MIL-C-39012 lab standard test connector interface.

CONSTRUCTION: Stainless steel body with either stainless steel or plated beryllium copper inner contact.

CASE DIMENSIONS: 8-1/2 in. (215.9 mm) wide x 10-3/4 in. (273 mm) long x 2-1/2 (63.5 mm) high.

WEIGHT: Net 2 lbs., 8 oz. (1.12 kg); Shipping 3 lbs. (1.36 kg)

Specifications subject to change without notice.

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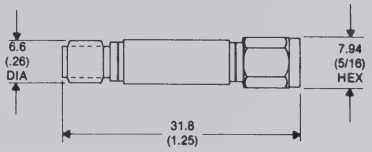
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

ATTENUATOR SET — MODEL WAS19

DC-26.5 GHz — SMA — 2 WATTS



NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.

ATTENUATOR SET: Four Model WA9 Attenuators: 3 dB, 6 dB, 10 dB, 20 dB.

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 26.5 GHz

STANDARD NOMINAL VALUES AND MAXIMUM DEVIATION FROM NOMINAL (including frequency sensitivity):

Standard Nominal Value (dB)	Deviation (dB)
3	± 0.5
6	± 0.6
10	± 0.8
20	± 1.0

MAXIMUM VSWR:

DC - 4.0:	1.10	12.4 - 18.0:	1.25
4.0 - 8.0:	1.15	18.0 - 26.5:	1.35
8.0 - 12.4:	1.20		

POWER RATING: 2 watts average, 500 watts peak. (Maximum rated power for all models to 25°C ambient temperature, derated linearly to 1 watt at 75°C and 0 watts at 125°C.)

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 55°C to 125°C

CALIBRATION DATA: A plastic laminated Certificate of Calibration is furnished in the lid of the case. The following data on each attenuator are provided: 3 DC resistance values and insertion loss ever 1.0 GHz from DC to 26 GHz.

CONNECTORS: SMA connectors per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connectors.

CASE DIMENSIONS: (5-1/2 in.) 139.7 mm long x (4-7/8 in.) 123.8 mm wide x (2-3/8 in.) 60.3 mm high.

WEIGHT: Net 1 lb., 4 oz. (0.56 kg); Shipping 2 lbs., 8 oz. (1.14 kg)

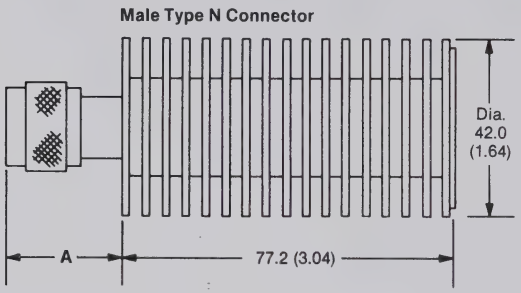
Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

HIGH POWER TERMINATION — MODEL WA1426

DC-8 GHz — TYPE N — 50 WATTS

NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.



Model Number	Connector	Dim. A
F1426	Female Type N	15.0 (0.59)
M1426	Male Type N	22.9 (0.90)

IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 8 GHz

MAXIMUM VSWR:
DC to 4 GHz: 1.20:1
4 to 8 GHz: 1.30:1

VSWR POWER COEFFICIENT: 0.001/watt

MAXIMUM POWER RATING: 50 watts average, 5 kW peak (maximum rated average power at 25°C ambient temperature, derated linearly to 0 watts at 125°C ambient).

TEMPERATURE RANGE: - 55°C to + 125°C

CALIBRATION: VSWR at 2.0 GHz, 4.0 GHz, and 8.0 GHz test data supplied.

CONNECTORS: Semi-Precision stainless steel Type N, male or female. (Specify sex when ordering by prefixing model number with M for male or F for female.)

WEIGHT: Net 0.28 kg (10 oz.); Shipping 0.68 kg (24 oz.)

Specifications subject to change without notice.

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Gaithersburg, Maryland 20879
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MEDIUM POWER TERMINATION

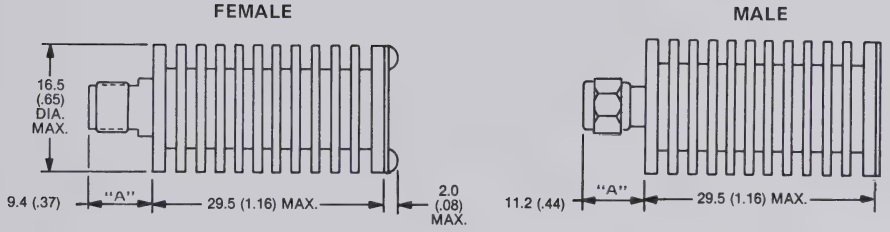
MODEL WA1419

DC-18.5 GHz

SMA

10 WATTS

NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.



NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 18.5 GHz

MAXIMUM VSWR:

DC - 8.0 GHz:	1.20
8.0 - 12.4 GHz:	1.30
12.4 - 18.0 GHz:	1.35

MAXIMUM POWER RATING: 10 watts average, 1 kW peak. Maximum rated average power to 25°C ambient temperature derated linearly to 0 watts at 125°C.

TEMPERATURE COEFFICIENT: 500 ppm/°C

TEMPERATURE RANGE: - 55°C to + 125°C

CALIBRATION: Sweep tested on slotted line system for VSWR.

CONNECTORS: SMA connectors per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connectors.

WEIGHT: Net 0.49 oz. (14 g); Shipping 1 lb. (0.45 kg)

Specifications subject to change without notice.

WEINSCHEL ASSOCIATES

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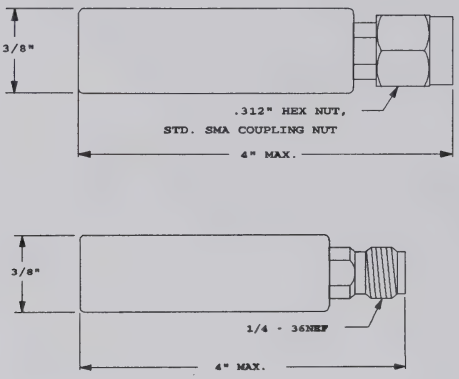
Phone: (301) 948-8342 Fax: (301) 869-9783

TERMINATION — MODEL WAT40

8-40 GHz — 2.92 mm — 1 WATT



MAXIMUM VSWR:
8-40 GHz: 1.35

POWER: 1 watt CW at 25°C; 0.1 watt at 85°C, derated linearly. 50 watts peak, (5 microsecond max. pulse width).

TEMPERATURE RANGE:
Operating: - 55°C to + 85°C
Non-operating: - 55°C to + 125°C

TEMPERATURE COEFFICIENT:
+ 0.07%/°C maximum

DIMENSIONS (max):

Length:	Female - 4 in.	Male - 4 in.
Diameter:	Female - .38 in.	Male - .38 in.

CONNECTORS: Comply with critical mating dimensions of high performance Grade One of 2.92 mm IEC working draft 46D (Secretariat) 145, Fig. 1, Male, page 4; Fig. 2, Female, page 5. Connectors mate with SMA (MIL-C-39012-55 and -57). Also mate with APC-3.5 mm and Wiltron Type K connectors.

CONSTRUCTION: Stainless steel, passivated body with stainless steel, passivated connector bodies. The female center conductor is heat treated beryllium copper with 4 slots for long life. The male body has heavy walls for long life. The connector life is greater than 1000 mating cycles.

WEIGHT: Net 9/16 oz.; Shipping 2 oz.

Specifications subject to change without notice.

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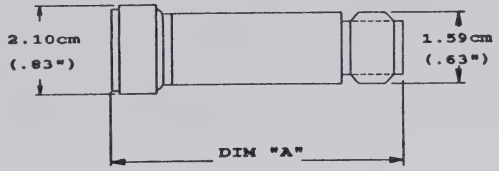
FIXED ATTENUATOR — MODEL WA50

DC-3 GHz — TYPE N — 1-2 WATTS



dB Value	Dim. A
1 - 10	8.18 cm. (3.22")
20 - 50	10.49 cm. (4.13")

CHARACTERISTIC IMPEDANCE: 50 ohms

FREQUENCY: DC to 3.0 GHz

ATTENUATION RANGE AND MAXIMUM DEVIATION:

Standard Nominal Value (dB)	Deviation		
	From Nominal At DC (± dB)	From DC	
		2 GHz (± dB)	3 GHz (± dB)
1 thru 5	0.02	0.1	0.2
6 thru 10	0.05	0.1	0.2
20 thru 50	0.10	0.15	0.3

MAXIMUM VSWR:
DC: 50 ± 1 ohms
1.0 GHz: 1.15
3.0 GHz: 1.20

POWER RATING:
1 to 6 dB: 2 watts average, 1 kW Peak
7 to 10 dB: 1 watt average, 1 kW Peak
20, 30, 40, 50 dB: 1 watt average, 1 kW Peak

TEMPERATURE RANGE: - 30°C to + 70°C (no derating)

CALIBRATION: Insertion loss in 50 ohm system at DC, 30 MHz, 1.0, 2.0 and 3.0 GHz.

ACCURACY OF CALIBRATION:

Frequency	VSWR	Insertion Loss	
		1 - 40 dB	50 dB
DC	1%	.005 dB/10 dB	0.02 dB
1 GHz	2%	0.1 dB or 0.1 dB/10 dB, whichever is greater.	
2 and 3 GHz	4%		

CONSTRUCTION: Stainless steel barrels. Type N stainless steel male and female connectors to mate nondestructively with connectors per MIL-C-39012 and MIL-STD-348A.

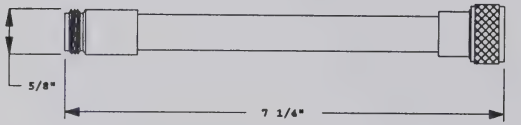
WEIGHT:
1 to 10 dB: Net 0.11 kg (4 oz.); Shipping 0.45 kg (1 lb.)
20 to 50 dB: Net 0.16 kg (5.5 oz.); Shipping 0.51 kg (1 lb. 2 oz.)

Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

FIXED ATTENUATOR — MODEL 210B

.4 - 18 GHz — TYPE N — 1 - 5 WATTS



IMPEDANCE: 50 ohms

FREQUENCY RANGES AND NOMINAL ATTENUATION VALUES:

Nom. Value (dB)	Freq. Range (GHz)	Maximum Insertion Loss Deviation				Power Rating When Properly Terminated	
		From Nom. Value at 4 GHz (dB)*	From 4 GHz				
			At 1 GHz (dB)	At 10 GHz (dB)	At 18 GHz (dB)	Avg (W)	Peak (kW) **
1	.4-18	±0.1	-0.2	+0.2	+0.8	5	10
2	.5-18	±0.1	-0.2	+0.2	+0.8	5	10
3	.6-18	±0.1	-0.2	+0.2	+0.8	5	10
4	1-18	±0.1	-0.3	+0.3	+0.8	4	8
5	1-18	±0.1	-0.4	+0.3	+0.8	3	6
6	1-18	±0.1	-0.5	+0.3	+0.8	3	6
7	1-18	±0.1	-0.6	+0.4	+0.9	2.5	5
8	1-18	±0.1	-0.8	+0.5	+0.9	1	1
9	1-18	±0.1	-1.0	+0.5	+0.9	1	1
10	1-18	±0.1	-1.1	+0.5	+0.9	1	1
20	2-18	±0.2	-1.3 ***	+1.0	+1.4	1	1

* These accuracies are available on special order at any specified frequency from 1 - 18 GHz for 1 to 10 dB values.
** For full peak power maximum pulse length, 5 microseconds.
*** At 2.0 GHz.

MAXIMUM VSWR:

Nominal Value	Frequency Range (GHz)	VSWR
1 dB	0.4 to 1.0	1.35
2 dB	0.5 to 1.0	1.35
3 dB	0.6 to 1.0	1.35
1 - 10 dB	1 to 2	1.35
	2 to 12.4	1.30
	12.4 to 18.0	1.50
20 dB	2 to 12.4	1.25
	12.4 to 18.0	1.50

POWER COEFFICIENT: < 0.003 dB/dB x W

TEMPERATURE RANGE:
Operating: - 55°C to + 85°C
Non-Operating: - 55°C to + 125°C

TEMPERATURE COEFFICIENT:
< 0.0008 dB/dB x °C

CALIBRATION FREQUENCIES: Certificate supplied giving insertion loss in 50 ohm system at 1.0, 4.0, 10.0 and 18.0 GHz up to 10 dB, and at 2.0, 4.0, 10.0 and 18.0 GHz for 20 dB. VSWR is guaranteed to be within specified limits.

CONNECTORS: Type N stainless steel. Mates with MIL-C-39012-1 and -2. Molded captive inner contact/bead assembly provides controlled and stable interface dimensions. Standard with male and female. Units with both connectors male or female are available. With these configurations, calibration accuracy is reduced by effect of double adapters used when setting power reference for calibration. When ordering append M or F to the model number. (For example, 210B-10M is Model 210B, 10 dB unit with two male connectors.)

CONSTRUCTION: Stainless steel body and connector bodies.

WEIGHT: Net 0.23 kg. (8 oz.); Shipping 0.51 kg. (1 lb., 2 oz.)

DIMENSIONS:
Length: 8.3 inches (21 cm.)
Diameter: Female Connector .64 in. (1.63 cm)
Male Connector .827 in. (2.10 cm)
Body .50 in. (1.27 cm)

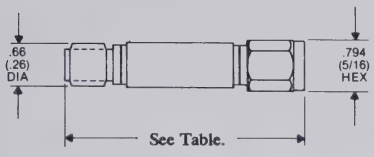
Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

FIXED ATTENUATOR — MODEL 240, 440, 840

2-40 GHz — 2.92 MM — 1 WATT

NOTE: Dimensions are given in cm (inches) and are maximum, unless otherwise specified



IMPEDANCE: 50 ohms

FREQUENCY RANGE AND ATTENUATION VALUES:

Model	Nominal Value (dB)	On Special Order - Any Values (dB)	Frequency Range (GHz)
240	3, 6, 10, 20	From 1 - 20	2.0 to 40
440	3, 6, 10	From 1 - 10	4.0 to 40
840	3, 6, 10, 20	From 1 - 20	8.0 to 40

MAXIMUM VSWR:

Model	Frequency Range (GHz)	VSWR
240-3, 6, 10	2 - 40	1.35
240-20	2 - 12.4	1.40
	12.4 - 40	1.35
440-3, 6, 10	4 - 40	1.30
840-3, 6, 10, 20	8 - 40	1.35

MATING TORQUE: 7 to 10 inch-lb., 80 to 115 Newton-cm.

INPUT POWER RATING (when properly terminated: 240: 1 watt; 440/840: 0.5 watt at 25°C; 0.1 watt at 85°C, derated linearly. All 50 watts peak, max. 5 microsecond pulse width.

POWER COEFFICIENT: < 0.05 dB/dB x W

TEMPERATURE RANGE:
Operating: 55°C to + 85°C
Non-operating: -55°C to +125°C

TEMPERATURE COEFFICIENT:
< 0.0008 dB/dB x °C

CALIBRATION FREQUENCIES: Certificate supplied giving insertion loss in 50 ohm system at 2.0, 4.0, 12.4, 26.5 and 40 GHz for model 240; 4.0, 8.0, 12.4, 26.5 and 40.0 GHz for model 440; 8.0, 12.4, 26.5, and 40 GHz for model 840. VSWR is guaranteed to be within specified limits.

CONNECTORS: 2.92 mm which mate with SMA per MIL-C-39012-55 & -57, 3.5 mm and Wiltron K. Standard with male and female. Units with both connectors male or female are available at $10.00 extra. With these configurations, calibration accuracy is reduced by 0.1 dB. When ordering append M or F to the model number. (For example, 440-10M is Model 440, 10 dB unit with two male connectors.)

WEIGHT:
Model 240: Net 2 oz. (56 gm.); Shipping 1 lb., 2 oz. (.5 kg)
Models 440/840: Net 1 oz. (28 gm.); Shipping 1 lb., 2 oz. (.5 kg)

MAX. LENGTH: inches (cm)

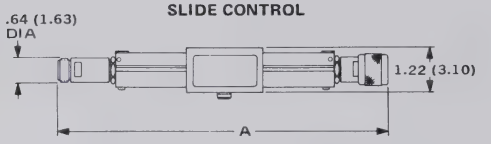
dB	240	440	840
3	7.3 (18.5)	4 (10.1)	1.5 (3.8)
6	7.3 (18.5)	4 (10.1)	2.0 (5.1)
10	7.3 (18.5)	4 (10.1)	2.5 (6.4)
20	7.3 (18.5)		4.0 (10.2)

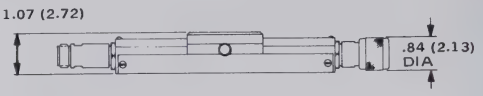
Specifications subject to change without notice.

WEINSCHEL ASSOCIATES
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

VARIABLE ATTENUATORS — MODEL 953, 973

1-11.0 GHz — TYPE N — 1 WATT





Model	Dim. A	
953	8-3/8	(21.27)
973	14-1/8	(35.88)

NOMINAL IMPEDANCE: 50 ohms

ATTENUATION RANGE:
Model 953: 3, 10 and 20 dB
Model 973: 10, 20 and 40 dB

INPUT POWER RATING (when properly terminated):
1 W CW average; 1 kW peak.

PHASE SHIFT: ~ 1°/dB x f(GHz) maximum

CONNECTORS: Stainless steel Type N, one male and one female.

WEIGHT:

	Net	Shipping (Min.)
953	13 oz. (.37 kg)	1 lb. 5 oz. (.54 kg)
973	1 lb. 4 oz. (.56 kg)	1 lb. 12 oz. (.51 kg)

	Model 953			Model 973		
Characteristic	3 dB	10 dB	20 dB	10 dB	20 dB	40 dB
Frequency Range	1.0 - 11.0 GHz	2.5 - 11.0 GHz	4.0 - 11.0 GHz	1.3 - 11.0 GHz	2.5 - 11.0 GHz	4.0 - 11.0 GHz
Insertion Loss at Minimum	0.7 dB max. at 4.0 GHz	0.8 dB max. at 4.0 GHz	1.0 dB max. at 8.0 GHz	1.0 dB max. at 4.0 GHz	1.0 dB max. at 4.0 GHz	1.5 dB max. at 8.0 GHz
Direct Reading Scale Calibration	4.0 GHz	4.0 GHz	8.0 GHz	4.0 GHz	4.0 GHz	8.0 GHz
Insertion Loss Corrections	Min., 1, 2, & 3 dB at 1.0 and 10.0 GHz	Min., 2, 4, 6 & 10 dB at 2.5 and 10.0 GHz	Min., 5, 10, 15 & 20 dB at 4.0 and 10.0 GHz	Min., 2, 4, 6, & 10 dB at 1.3 and 10.0 GHz	Min., 5, 10, 15 & 20 dB at 2.5 and 10.0 GHz	Min., 10, 20, 30 & 40 dB at 4.0 and 10.0 GHz
Max. Correction from Scale Value	± 0.5 dB	± 0.8 dB	± 1.0 dB	+ 1.0 dB - 1.2 dB	+ 1.2 dB - 1.0 dB	+ 1.2 dB - 2.2 dB
Calibration Accuracy (Incl. Resettability)	0.1 dB	0.2 dB	0.3 dB	0.1 dB	0.2 dB	0.4 dB
Scale Resolution	~ 0.60 in./dB	~ 0.25 in./dB	~ 0.12 in./dB	~ 0.5 in./dB	~ 0.25 in./dB	~ 0.12 in./dB
Scale Increments	0.2 dB	0.5 dB	0.5 dB	0.2 dB	0.5 dB	0.5 dB
Maximum VSWR	1.50	1.50	1.50	1.50	1.60 2.5 - 4 GHz 1.50 4 - 11 GHz	1.70 4 - 6 GHz 1.50 6 - 11 GHz

Specifications subject to change without notice.

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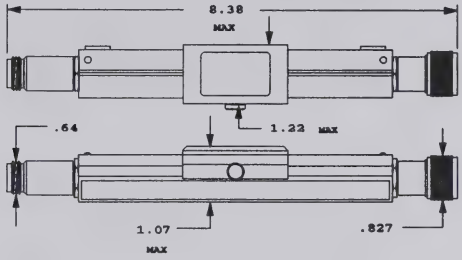
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

VARIABLE ATTENUATOR — MODEL 953B

1-18 GHz — TYPE N — 1 WATT



Characteristic	Model 953B		
Incremental Range *	3 dB	10 dB	20 dB
Frequency Range	1-18 GHz	2.5-18 GHz	4-18 GHz
Scale Correct at	8.0 GHz	8.0 GHz	8.0 GHz
Furnished Insertion Loss Corrections	Min., 1, 2 & 3 dB at 1 and 18 GHz	Min., 2, 4, 6 & 10 dB at 2.5 and 18 GHz	Min., 5, 10, 15 & 20 dB at 4 and 18 GHz
Max. Correction from Scale Value	± 0.6 dB	± 1.2 dB	± 2.0 dB
Calibration Accuracy (Incl. Resettability)	0.1 dB	0.2 dB	0.3 dB
Scale Resolution	~ 0.60 in/dB	~ 0.25 in/dB	~ 0.12 in/dB
Scale Increments	0.2 dB	0.5 dB	0.5 dB

* Any value from 1 to 20 dB on special order.

NOMINAL IMPEDANCE: 50 ohms

PHASE SHIFT WITH CHANGE IN ATTENUATION: ~ 1°/dB x f(GHz) maximum

POWER COEFFICIENT: < 0.003 dB/dB x W

INPUT POWER RATING (when properly terminated): 1 watt average at 23°C; .1 watt at 85°C, derated linearly. 1 kW peak (max. 5 microsecond pulse width).

TEMPERATURE COEFFICIENT:
953B-3: < 0.0008 dB/dB x °C
953B-10 and -20: < 0.0004 dB/dB x °C

TEMPERATURE RANGE:
Operating: - 55°C to + 85°C
Non-operating: - 55°C to + 125°C

CONNECTORS: Stainless steel Type N. Male - Input, Female Output. Mate with MIL-C-39012-1 and -2.

WEIGHT: Net 0.37 kg. (13 oz.); Shipping 0.60 kg. (1 lb. 5 oz.)

Specifications subject to change without notice.

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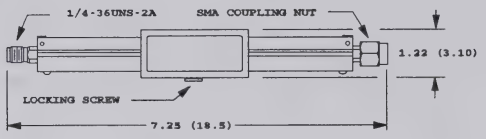
42 Cessna Court (Airpark)
Gaithersburg, Maryland 20879
Phone: (301) 948-8342 Fax: (301) 869-9783

VARIABLE ATTENUATOR — MODEL 953K

1-40 GHz — 2.92 MM — 0.5 WATTS

SLIDE CONTROL



Maximum dimensions in inches (cm).

* Mates with SMA, 3.5 mm, Type K[(1)].
(1) K Connector is a registered trademark of Wiltron Co.

NOMINAL IMPEDANCE: 50 ohms

ATTENUATION RANGE: 3, 10 and 20 dB

CONNECTORS: Stainless steel 2.92 mm, Male, Female

PHASE SHIFT WITH CHANGE IN ATTENUATION: ~ 1°/dB x f(GHz) maximum

INPUT POWER RATING (when properly terminated): 0.5 watt average, 100 watt peak; derated linearly to zero from 25 to 85°C.

POWER COEFFICIENT: < 0.001 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0003 dB/dB x °C

TEMPERATURE RANGE: 0° to 85°C

WEIGHT: Net 0.37 kg (13 oz); Shipping 0.60 kg (1 lb., 5 oz.)

	953K		
Characteristic	3 dB	10 dB	20 dB
Freq. Range	1 - 40 GHz	3 - 40 GHz	4 - 40 GHz
Min. Insertion Loss, Residual	1.0 dB max at 18 GHz	1.5 dB max at 18 GHz	2.0 dB max. at 18 GHz
Direct Reading Scale Calibration At	18 GHz	18 GHz	18 GHz
Insertion Loss Corrections	Min., 1, 2 & 3 dB at 1 and 40 GHz	Min., 2, 4, 6 & 10 dB at 3 and 40 GHz	Min., 5, 10, 15 & 20 dB at 4 and 40 GHz
Max. Correction from Scale Value	± 1.0 dB	+ 2.5 dB - 1.0 dB	± 2.5 dB
Calibration Accuracy (Incl. Resettability)	0.1 dB	0.2 dB	0.3 dB
Scale Resolution	~ 0.60 in/dB	~ 0.25 in/dB	~ 0.12 in/dB
Scale Increments	0.2 dB	0.5 dB	0.5 dB
Max. VSWR to 18.0 GHz to 40.0 GHz	1.50 1.35	1.50 1.35	1.50 1.50

Specifications subject to change without notice.

WEINSCHEL ASSOCIATES

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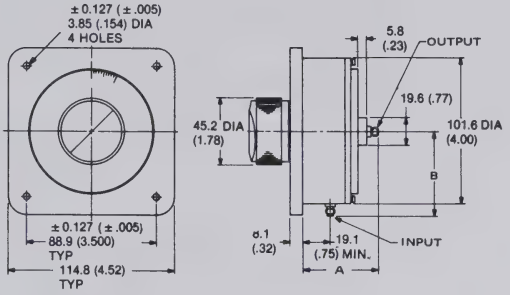
VARIABLE ATTENUATOR MODEL VA/04/60, VA/02/100

DC-4 GHz TYPE N, SMA 5 WATTS



NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.

Connector Options	Connector Type Input	Output	Dim "A" mm (in.)	Dim "B" mm (in.)
- 34	N Female	N Male	66.0 (2.6)	68.1 (2.68)
- 44	N Male	N Male	66.0 (2.6)	71.9 (2.83)
- 33	N Female	N Female	61.0 (2.4)	68.1 (2.68)
- 12	SMA Female	SMA Male	55.6 (2.19)	58.2 (2.29)
- 22	SMA Male	SMA Male	55.6 (2.19)	61.5 (2.42)
- 11	SMA Female	SMA Female	52.3 (2.06)	58.2 (2.29)

NOMINAL IMPEDANCE: 50 ohms

	Frequency	Incremental Attenuation
VA/04/60	DC - 4 GHz	60 dB
VA/02/100	DC - 2 GHz	100 dB

PHASE SHIFT WITH CHANGE IN ATTENUATION: 1°/dB x f(GHz) maximum

POWER RATING: 5 watts average, 0.5 kW peak, to 25°C ambient temperature, derated linearly to 0 watts at 85°C.

MINIMUM INSERTION LOSS: 6 dB nominal

MAXIMUM SWR:

DC - 1 GHz:	1.50
1 - 2 GHz:	1.60
2 - 3 GHz:	1.70
3 - 4 GHz:	1.80

ACCURACY:
VA/04/60: ± 0.25 dB or 0.4% at 2 GHz
VA/02/100: ± 0.5 dB or 1% at 1 GHz

DIAL CALIBRATION (in 1 dB increments):
VA/04/60 6 to 66 dB ~ 180° approx.
VA/02/100 6 to 106 dB ~ 270° approx.

Specifications subject to change without notice.

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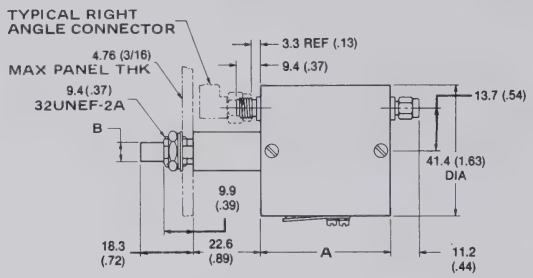
STEP ATTENUATOR MODEL WA9009, WA9010, WA9011

DC-18 GHz SMA 2 WATTS



Model No.	Dim. A - mm (in)	Dim. B - mm (in)
WA9009	28.7 (1.13)	3.25 (.125)
WA9010	41.4 (1.63)	6.35 (.250)
WA9011	51.6 (2.03)	6.35 (.250)

NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGES (and Model No. Prefix to Designate Range):
All Models:
DC to 4 GHz (AC)
DC to 8 GHz (AD)
DC to 12.4 GHz (AE)
DC to 18 GHz (AF)

STANDARD INCREMENTAL ATTENUATION RANGE:
Model WA9009: 0 to 9 dB in 1 dB steps
Model WA9010: 0 to 60 dB in 10 dB steps
Model WA9011: 0 to 90 dB in 10 dB steps

ZERO INSERTION LOSS AND INCREMENTAL ATTENUATION ACCURACY:
See Tables 1 and 2.

MAXIMUM VSWR:
DC to 4 GHz: 1.25
DC to 8 GHz: 1.35
DC to 12.4 GHz: 1.50
DC to 18 GHz: 1.60

POWER RATING: Maximum 2 watts average, 200 watts peak. (Maximum rated average power to 25°C ambient temperature, derated linearly to 1 watt at 54°C).

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT:
< 0.0004 dB/dB x °C

INSERTION LOSS CALIBRATION:
DC to 4 GHz: At DC and 4 GHz
DC to 8 GHz: At DC, 4 and 8 GHz
DC to 12.4 GHz: At DC, 4, 8 and 12 GHz
DC to 18 GHz: At DC, 4, 8, 12 and 18 GHz

INCREMENTAL PHASE SHIFT:
~ 0.5°/dB x f(GHz)

REPEATABILITY: Better than 0.05 dB across frequency band for switch life.

SWITCH LIFE: Over 1,000,000 steps

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STEP ATTENUATOR MODEL WA9009, WA9010, WA9011

DC-18 GHz SMA 2 WATTS

CONSTRUCTION:

Drum Assembly: Aluminum Alloy
Housing: Phenolic or Aluminum
Control Shaft: Stainless Steel

CONNECTORS: SMA connectors per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connectors.

SMA Connector	Numerical Designation	Available Combinations[1]
Female, Standard Male, Standard	1 2	11, 12, 13, 14

[1] First digit designates front connector. Second digit designates rear connector. Standard male SMA connector not available as front connector.

KNOB: All models supplied with control knob.

ENVIRONMENTAL:

Operating:
Temperature: 0°C to + 54°C
Relative Humidity: to 95%
Altitude: to 10,000 feet

Non-operating:
Temperature: - 54°C to + 54°C
Relative Humidity: to 100%, including condensation
Altitude: to 40,000 feet
Shock: 8 g's, 100 ms, 1/2 sine
Vibration: 5-8 cps,.20" dbl amplitude
8-15 cps,.10" dbl amplitude
15-55 cps,.36" dbl amplitude
Supported rigidly front and back.

WEIGHT:

Model No.	Net (oz.)	(kg)	Shipping (lb.)	(kg)
WA9009	2.4	0.068	1	0.45
WA9010	5.7	0.16	1-1/2	0.68
WA9011	7.1	0.20	1-1/2	0.68

SHAFT ROTATION: CW for increasing attenuation

INDEXING: 36°

Table 1. Model WA9009 Zero Insertion Loss and Incremental Attenuation Accuracy

Frequency Range (GHz)		DC-4	DC-8	DC-12.4	DC-18
Maximum Zero Insertion Loss		0.3 dB	0.5 dB	0.7 dB	1.0 dB
Incremental Insertion Loss Accuracy (dB)	1 dB thru 9 dB	± 0.3	± 0.3	± 0.3	± 0.5

Table 2. Models WA9010 and WA9011 Zero Insertion Loss and Incremental Attenuation Accuracy

Frequency Range (GHz)		DC - 4	DC - 8	DC - 12.4	DC - 18
Maximum Zero Insertion Loss	Model WA9010	0.4 dB	0.5 dB	0.7 dB	1.0 dB
	Model WA9011	0.5 dB	0.6 dB	0.7 dB	1.0 dB
Incremental Insertion Loss Accuracy (dB)	10 dB	± 0.3	± 0.4	± 0.5	± 1.0
	20 dB	± 0.3	± 0.4	± 0.5	± 1.0
	30 dB	± 0.4	± 0.5	± 0.6	± 1.0
	40 dB	± 0.5	± 0.6	± 0.8	± 1.2
	50 dB	± 0.7	± 0.8	± 1.0	± 1.5
	60 dB	± 0.8	± 0.9	± 1.2	± 1.8
	70 dB	± 0.9	± 1.1	± 1.4	± 2.1
	80 dB	± 1.0	± 1.2	± 1.6	± 2.3
	90 dB	± 1.2	± 1.4	± 1.8	± 2.5

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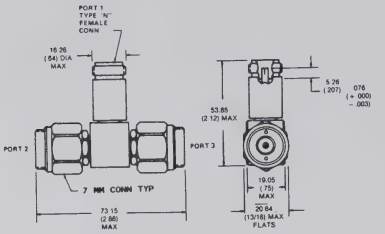
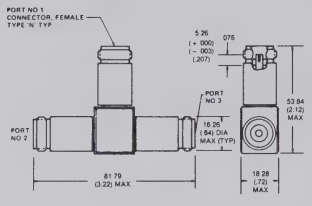
POWER SPLITTER — MODEL PS-018, 7PS-018

DC-18 GHz — TYPE N, 7 MM — 1 WATT



NOTE: Dimensions are given in mm (inches) and are maximum, unless otherwise specified.



NOMINAL IMPEDANCE: 50 ohms

FREQUENCY RANGE: DC to 18.0 GHz

INPUT VSWR: DC to 18.0 GHz: 1.30 max. if both output ports are terminated in 50 ohms

EQUIVALENT OUTPUT SWR (Port 2 & 3)*:

DC - 2 GHz:	1.05
2 - 4 GHz:	1.07
4 - 8 GHz:	1.10
8 - 18 GHz:	1.15

* When used in a leveling or ratio system.

MAXIMUM IMBALANCE OF POWER DIVISION:

DC - 8 GHz:	0.15 dB
8 - 18 GHz:	0.20 dB
	0.1 dB Typical

PHASE TRACKING: ± 2° maximum between output ports

INSERTION LOSS (input to either output): 6 dB nominal, 7.5 dB max.

POWER COEFFICIENT: < 0.005 dB/dB x W

TEMPERATURE COEFFICIENT: < 0.0004 dB/dB x °C

TEMPERATURE RANGE: - 55°C to + 85°C

POWER: 1 watt CW, 1 kW peak (5 microsecond pulse width) maximum (input connector only)

CONNECTORS: Input - Type N female output connectors, stainless steel. Female N (PS-018) or GPC-7 (7PS-018). Type N connectors per MIL-STD-348 interface dimensions - mate nondestructively with MIL-C-39012 connectors. GPC-7 connectors per IEEE-STD-287.

WEIGHT: Net 6 oz. (0.17 kg); Shipping 1 lb. (0.45 kg)

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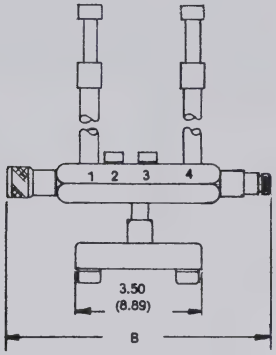
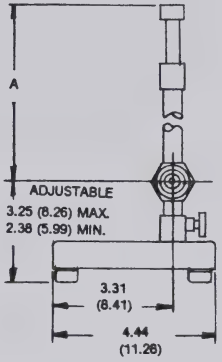
DOUBLE STUB TUNERS

MODEL DS-109

40 MHz - 13 GHz

TYPE N





LINE IMPEDANCE: 50 ohms

CONNECTORS: Tuners are equipped with close tolerance, stainless steel Type N, one male, one female, for long life with minimum wear.

MATCHING RANGE: From 7:1 to 1.00 within tuner frequency range.

DIMENSIONS:
Dimensions are given in inches (cm) and are maximum, unless otherwise specified.

Model No.	Dim. A*	Dim. B
DS-109	18.50 (46.49)	7.38 (18.75)
DS-109L	32.50 (82.55)	7.38 (18.75)
DS-109LL	63.25 (160.66)	12.00 (30.48)
DS-109H	48.07 (122.10)	12.00 (30.48)

Model No.	DS-109	DS-109L	DS-109LL	DS-109H**
Freq. Range	0.75 - 13.0 GHz	0.4 - 4.0 GHz	0.2 - 2.0 GHz	40 - 400 MHz
Length of Stub	70.5 cm.	38 cm.	76 cm.	53 cm.
Net Weight	5 lbs. (2.56 kg)	6 lbs. (2.73 kg)	12 lbs. (5.45 kg)	12 lbs. (5.45 kg)
Shipping Weight	8 lbs. (3.64 kg)	9 lbs. (4.38 kg)	15 lbs. (6.82 kg)	15 lbs. (6.82 kg)

* Stub height is adjustable, maximum value given.

** Two pedestals are used for DS-109LL and DS-109H.

Specifications subject to change without notice.

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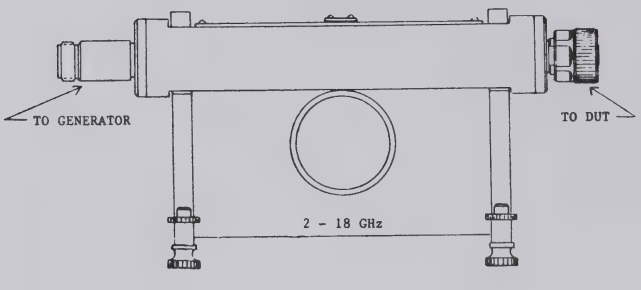
SLOTTED LINE MODEL SL1024

2-18 GHz



CHARACTERISTIC IMPEDANCE: 50 ohms ± 0.1 ohm

FREQUENCY RANGE: 2.0 to 18.0 GHz

PROBE TRAVEL: 8.0 cm. max. (> $\lambda/2$ at 2 GHz)

ASSEMBLIES:
1024Y, Probe and Detector Assembly
1024Z, Carriage Assembly

VARIATIONS IN OUTPUT DUE TO SLOPE AND IRREGULARITIES: < ± 0.005

PROBE EFFECT: < 1.01 as viewed as input of slotted section

RF MEASUREMENT PROBE BANDWIDTH: 2.0 - 18.0 GHz

LEVELING SCREWS: Knurled thumb screws provided on all four carriage legs

DIMENSIONS: 10-1/16 in. (25.5 cm.) wide; 6 in. (15.2 cm.) deep; 3-3/4 in. (9.53 cm.) high

WEIGHT: Net 3-3/8 lb. (1.52 kg.); Shipping 6 lb. (2.73 kg)

MODEL 1024 SLOTTED SECTION:

Model	Msmt. Connector	Residual VSWR
1024-1	N male	1.02*
1024-2	N female	1.02*
1024-5	7 mm Precision	1.01

* Mating gap adjusted to zero. Input connector is N female standard.

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SLIDING TERMINATION

MODEL WAST240

2-40 GHz

DESCRIPTION

The impedance accuracy of the airline, neglecting skin effect, is maintained by close mechanical tolerances. The I.D. of the outer conductor is held to ± 100 microinches. The O.D. of the inner conductor is held to ± 50 microinches. The conducting surfaces of the precision airlines are solid coin silver. The inner conductor is slightly springloaded for zero gap. It protrudes when not mated to facilitate coupling. The connector[1] does not use an insulator. The bearing surfaces of the connector which do not carry any R.F. currents, are made of harder metals for longer life. Travel exceeds one half wavelength at the lowest frequency.

APPLICATION

- Calibration of residual VSWR of slotted lines using "coupled sliding load" method.[3]
- Impedance calibration of network analyzers.
- Measurement of directivity of directional couplers.

SPECIFICATIONS

MODEL NUMBERS FOR SLIDING TERMINATIONS

MODEL	CONNECTOR TYPE	FREQUENCY RANGE, GHz	IMPEDANCE ACCURACY OF AIRLINE*	MAX. LENGTH	SKIN EFFECT,[2] LOW FREQUENCY LIMIT OF INCREASE OF IMPEDANCE** 0.05%	0.1%	0.5%	1.0%
ST-2 ST-1 ST-5	Precision Male N Precision Female N* 7 mm Precision Sexless*** GPC-7	2 - 18	0.1%	22.0"	3.4 GHz	.84 GHz	34 MHz	8.4 MHz
ST-4 ST-3	3.5 mm Precision Male 3.5 mm Precision Female	8 - 34	0.2%	10.0"	13 GHz	3.4 GHz	130 MHz	34 MHz
ST-9 ST-8	2.92 mm Precision Male 2.92 mm Precision Female	8 - 40	0.3%	10.0"	19 GHz	4.8 GHz	190 MHz	48 MHz

* Due to dimensional tolerances.
** Additional errors due to skin effect.
*** See Figure 1 for coupling of LPC inner conductor to GPC.

[1] Coaxial Connectors: A Look to the Past and Future, B.O. Weinschel, MSN, Feb. 1990, pp. 24-31.
[2] Errors In Coaxial Airline Standards Due to Skin Effect, B.O. Weinschel, Microwave Journal, Nov. 1990, pp. 131-143.
[3] Precision Coaxial VSWR Measurements by Coupled Sliding Load Technique, B.O. Weinschel et al., IEEE Vol. IM-13, No. 4, Dec. 1964, pages 292-300.

Specifications subject to change without notice.

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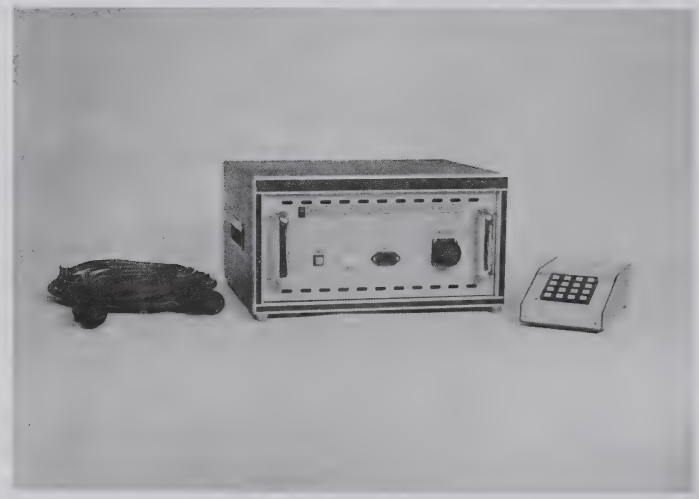
PA-4B



PA-4B POWER MODULE

LASER PISTON ATTENUATOR
DUAL FREQUENCY 1.25 MHZ AND 30.0 MHZ

MODEL PA-4B

FEATURES

- **DUAL FREQUENCY OPERATION** - Operates at 1.25 MHz and 30.0 MHz.
- **RESOLUTION OF READOUT**
  - Incremental Insertion Loss: 0.0001 dB using laser interferometer
  - Total Insertion Loss: 0.002 dB using optical encoder
- **INCREMENTAL ADJUSTMENT RANGE** - 100 dB minimum above 10 dB zero loss
- **INCREMENTAL ACCURACY** - ± 0.001 dB/10 dB ± 0.0005 dB between 15 and 115 dB total insertion loss.
- **VSWR (50 ohms)** - Maximum 1.2:1; typically 1.05:1
- **SELF CORRECTING** - For higher order modes, internal crosstalk, temperature, and air pressure.
- **CONTROL** - Manually on front panel or through external control box or via IEEE Bus and controller (e.g. HP-85).

APPLICATIONS

LABORATORY STANDARDS FOR IF SUBSTITUTION SYSTEMS

- Attenuator calibration.
- Measurement of insertion loss.
- Linearity measurement of receiver, power meter or network analyzer.
- Calibration of SPA-1, SPA-2, PA-2, VM-3, VM-4, VM-7, and VM-24.

DESCRIPTION

The heart of the instrument is a precisely formed stainless steel circular waveguide which is operated in the TE_{11} waveguide-below-cutoff mode. The sending antenna is moved manually or by a stepping motor over its range of more than 100 dB. The vernier control moves the receiving antenna over a small range.

The total insertion loss is determined approximately with an independent optical encoder. The incremental insertion loss is measured accurately with a stabilized helium-neon laser using a Michelson interferometer.

Attenuation is displayed digitally on the front panel with a resolution of 0.0001 dB. The incremental insertion loss range exceeds 100 dB above a nominal zero loss of 10 dB. Input and output impedances are matched by cascaded tuned dual impedance transformers to 50 Ω at both operating frequencies.

Automatic error compensations correct for temperature and air pressure changes. The attenuation can be changed manually or remotely using the external control box or through an IEEE-488 bus which also permits read-out.

ELECTRICAL

The laser light is travelling between both antennae in the center of the circular waveguide, thus measuring directly changes in actual separation of the two antennae along the same path as the TE_{11} mode propagates. The laser signal is converted to attenuation in dB and corrected for skin effect, the refractive index of air and changes due to temperature of the waveguide and air pressure.

Corrections are made automatically for the waveguides' expansion and change of skin depth with temperature, for either of the two operating frequencies as well as for internal leakage, and for higher order waveguide modes.

The direct traceability to U.S. National Standards at 1.25 MHz is within ± 0.0003 dB/6 dB. The dB reading is displayed on the front panel to the nearest 0.0001 dB.

One can also display all corrections and constants used in the automatic calculations as well as the coil separation, insertion loss, temperature, and air pressure.

The total and incremental insertion loss and attenuation can be controlled manually from the front panel as well as remotely through either the external control box or via the IEEE bus. All data available on the LED display can be read through the IEEE bus. The corrections are made automatically or can be made manually.

Undesired electric heat sources, such as power supplies, are remotely located, connected via a 10 ft. 22 conductor cable. The temperature of the hard-sealed helium-neon laser is stabilized to stay in a 0.1° C range through a proportional control circuit to minimize laser mode shifts.

Specifications subject to change without notice; consult factory.

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MECHANICAL

The circular waveguide and interferometer are mounted on a stable surface plate made of an aged and stress releaved meahanite. The waveguide temperature and air pressure are monitored by sensors. Temperature and pressure data are updated periodically.

The inside diameter of the circular waveguide is formed from carefully selected and aged stainless steel. It has a nominal diameter of 1.598" (20 dB/inch) to an accuracy of ±20 micro-inches, corresponding to an uncertainty of 0.00013 dB/10 dB. This, together with the temperature and air pressure data, provides the basis for attenuation accuracy.

The position of the sending antenna is adjusted either by the handwheel on the front panel or by the stepping motor (0.005 dB/step).

The receiving antenna is moved by a vernier controlling a linear magnetic motor over a range of 0.015 dB with a resolution of 0.0001 dB.

A Michelson interferometer principle is used which measures only the distance between the beam splitter and the corner reflector, independent of changes in the path length from the interferometer to the laser head and receiver. The laser interferometer measures the displacement of the sending and receiving antennae to a resolution of 0.0001 dB or 5 microinches. The interferometer beam splitter and a corner cube reflector are mounted directly on the receiving and sending antennae, respectively. This eliminates parallax errors. This Michelson interferometer measures only the displacement between the beam splitter and the corner cube reflector. The interferometer resolves one eighth wave length which corresponds to 0.00006 dB or 3 microinches.

OPERATION

The attenuator may be set with the external control box or through the IEEE-bus, or from the front panel either with the handwheel or with the motor drive control which operates both the stepping motor and vernier. The display may be scrolled to read the attenuation, the change of attenuation from a given reference, and the frequency for which the attenuator is set (1.25 or 30.0 MHz). The attenuation reference may also be set from the front panel.

An internal keyboard which can be accessed only by removing the instrument covers permits changing of any constants and corrections used in the calculations when the instrument is verified against National Standards. However, under normal operations, no changes are experienced. This can also be accomplished automatically using a calibration tape (furnished) for an external instrument controller such as the H.P. model 85.

MAINTENANCE

The calibration tapes for the HP85 controller using either a VM-4 or a dual input (1.25/30.0 MHz) specially modified VM-7 are used for initial set-up and periodic maintenance to verify the instrument's accuracy.

A self-test circuit steps through major circuits and exercises also the piston and the automatic bias circuit. In case of failure, it indicates in what portion of the self-test program a failure occured.

SPECIFICATIONS

- **OPERATING FREQUENCIES**[1]: 1.25 MHz ± 0.05 MHz and 30.0 MHz ± 0.1 MHz.
- **WAVEGUIDE MODE:** TE_{11}, operated below cutoff
- **INCREMENTAL ATTENUATION RANGE:** Greater than 100 dB
- **MINIMUM INSERTION LOSS:** 10 dB nominal
- **RESOLUTION:** 0.0001 dB for Δ dB, 0.002 dB for total loss.
- **ATTENUATION READOUT:** Front panel 7 digit LED or remotely via IEEE-488 bus.
- **CONNECTORS:** Type N Jacks for input and output, on front panel.
- **MAX. VSWR (INPUT AND OUTPUT):** 1.2 maximum at 1.25 and 30.0 MHz in 50 ohm system
- **ACCURACY OF INCREMENTAL INSERTION LOSS**[2]: ± 0.001 dB/10 dB ± 0.0005 dB between 15 and 115 dB total loss
- **OPERATING AMBIENT TEMPERATURE**[3]: 23°C ± 5°C
- **WARM-UP:** 24 hours minimum
- **LINE VOLTAGE**[4]: 100-120/200-240 Vac ± 10%, 47-63 Hz.
- **VIBRATION AND ACCOUSTIC NOISE LEVELS:** See Note 5
- **ACCESSORIES:** Power Supply Box, Controller Box, Calibration Tape, Two Power Cables, One 22 Wire Power Cable, Instruction and Maintenance Manual
- **WEIGHT:** Net: 77 kg. (170 lbs.); Shipping: 145 kg. (320 lbs.)
- **DIMENSIONS:** PA-4B 28-1/4 in. L x 15-5/8 in. W x 11-1/4 in. H (71.8 cm. L x 39.7 cm. W x 28.6 cm. H); Power Supply Box 16.60 in. L x 14.40 in. W x 9.25 in. H (421.6 mm. L x 365.7 mm. W x 234.9 mm. H); Controller Box 9.38 in. L x 5.19 in. W x 3.06 in. H (238.3 mm. L x 131.8 mm. W x 77.6 mm. H)
- **PRICE:** Contact Factory

[1] Dual tuned launching and receiving antennae are used. No mechanical or calibration changes are required when switching operating frequency.
[2] Corrections for other modes in initial region and internal leakage in the high attenuation region are stored internally and corrected values of attenuation are displayed automatically.
[3] Ambient temperature must be stable within ±1°C over one hour. Maximum rate of temp. change must not exceed 1°C/hr. (Avoid air blasts from heating or cooling systems or direct sunshine.); Twenty-four hours operation are recommended to reach thermal stability.
[4] Line voltage must be free of transients and signals and must be stable to ±2%.
[5] Acoustic and noise level, vibration or mechanical shock, should not exceed that typically found in National Standards Laboratories.

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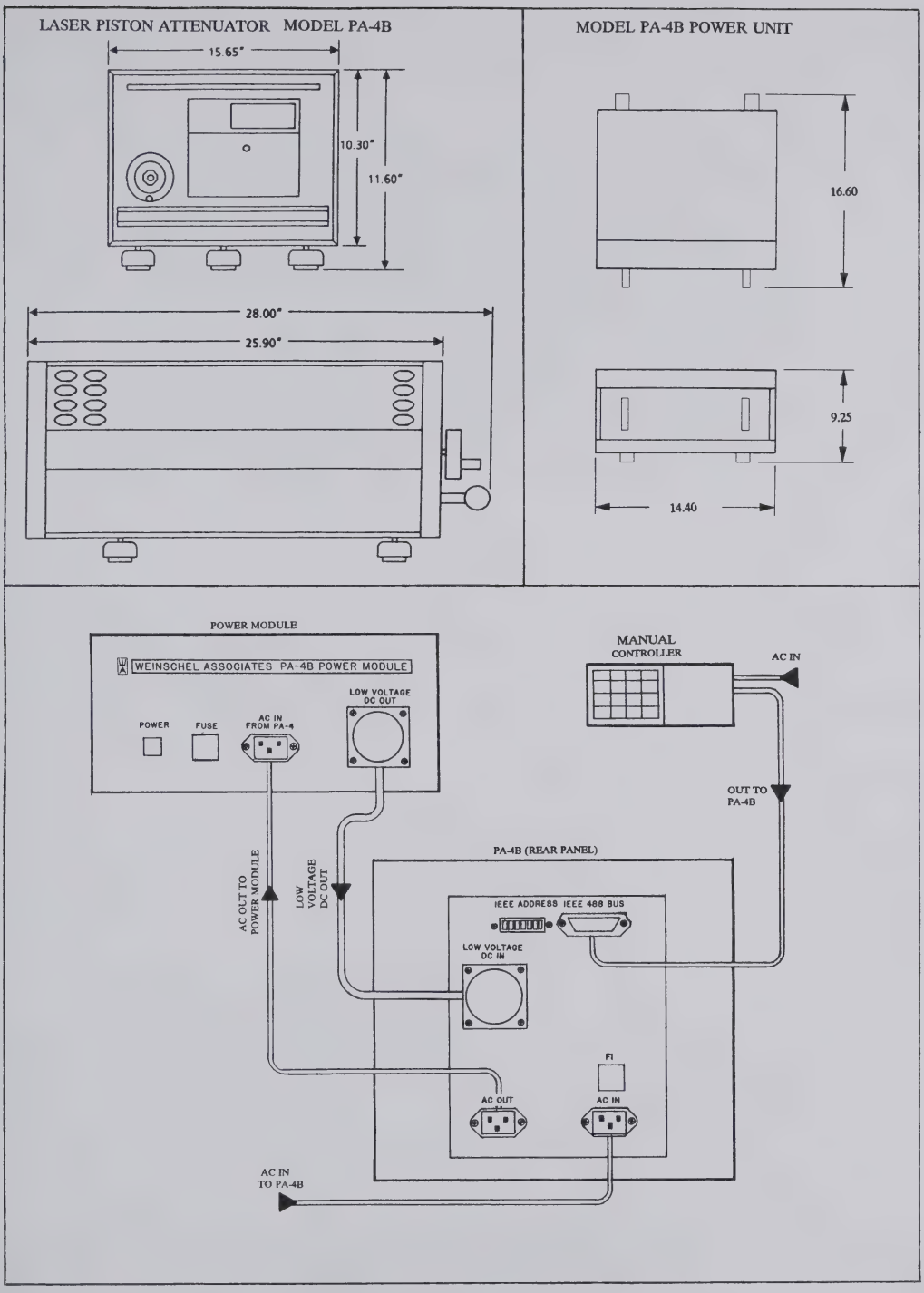
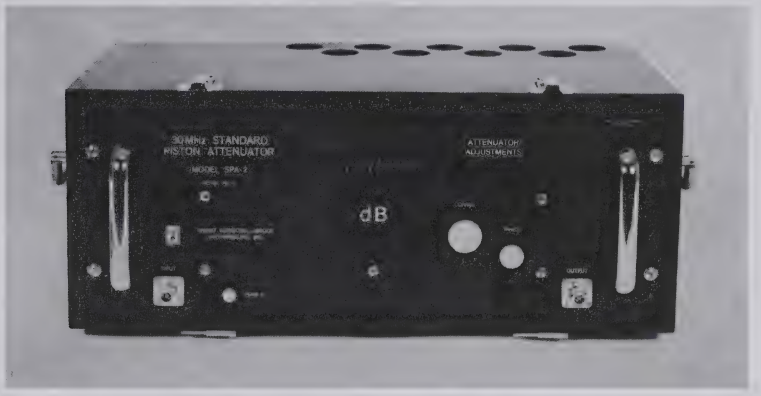


LASER PISTON ATTENUATOR MODEL PA-4B
SYSTEM LAYOUT

INTRODUCING
THE
NEW
SPA-2
AND
SPA-3

STANDARD PISTON ATTENUATORS
MODELS SPA-2 (30.0 MHz) AND SPA-3 (1.25 MHz)
WITH AUTOMATIC DIGITAL READ-OUT

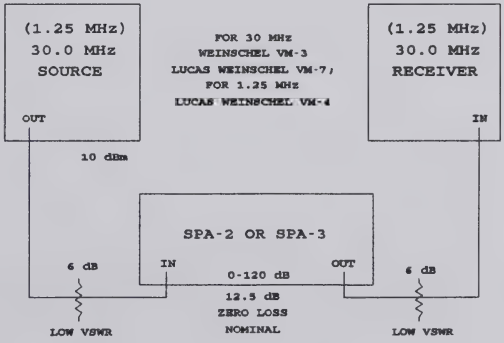


FEATURES

- **ABOUT 2,000 OF THESE PISTON ATTENUATORS WERE MADE SINCE 1960.**
- **RESOLUTION OF DIGITAL READOUT: 0.001 dB**
- **CONTINUOUS VARIABLE ATTENUATION RANGE**
  - Incremental attenuation: 0 to 120 dB
  - 12.5 dB zero insertion loss, typical.
- **OPERATING FREQUENCY :** SPA-2 - 30 MHz
  SPA-3 - 1.25 MHz
- **INPUT AND OUTPUT IMPEDANCE : 50 OHMS**
  - Maximum VSWR 1.20, at center frequency
- **INCREMENTAL ACCURACY** (above zero loss)
  - 0.01 dB from 0 to 15 dB
  - 0.005 dB/10 dB from 15 to 100 dB,
  - 0.01 dB/10 dB from 100 to 120 dB.
- **FINE AND COARSE DRIVES**
  - 29 dB/revolution in coarse control
  - 0.15 dB/revolution in fine control

APPLICATIONS

The Weinschel Associates Models SPA-2 and SPA-3 calibrate measurement receivers and parallel or series I.F. substitution systems at 30.0 MHz and 1.25 MHz, respectively. They read digitally the incremental attenuation with a resolution of 0.001 dB.



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42 Cessna Court (Airpark)
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Phone: (301) 948-8342 Fax: (301) 869-9783

DESCRIPTION

The Weinschel Associates Models SPA-2 and SPA-3 Standard Piston Attenuators contain an accurately dimensioned tube acting as a circular waveguide-below-cutoff operating in the lowest mode, the TE_{11} mode. The construction of the piston attenuator is time-tested in over 2,000 units since 1960. Its accuracy is traceable to NIST/NBS, the National Institute of Standards and Technology. The device can be calibrated by NIST on special order. Models SPA-2 and SPA-3 have a minimum insertion loss around 12.5 dB. A calibration accurate to ±0.01 dB is furnished for the first 20 dB incremental insertion loss in a 50 Ohm system above the minimum loss. The unit is mounted with an integral shield on a standard 19" x 7" panel. It can be removed from its wooden box for rack mounting.

SPECIFICATIONS

OPERATING FREQUENCY
SPA-2 30 MHz
SPA-3 1.25 MHz
WAVEGUIDE MODE:
TE_{11} mode, below cutoff
INCREMENTAL ATTENUATION RANGE:
0 to 120 dB minimum
ACCURACY, DIRECT READING: (LINEAR RANGE)
0.005 dB/10 dB from 15 to 100 dB;
0.01 dB/10 dB from 100 to 120 dB
ACCURACY, WITH CORRECTION:(NON-LINEAR RANGE) - 0.01 dB from 0 to 15 dB
Calibration accurate to ±0.01 dB from 0 to 15 dB incremental insertion loss
(Deviation typically < 0.1 dB above 5 dB, < 0.01 dB above 12 dB)
TEMPERATURE COEFFICIENT:
< 0.00002 dB / (dB x °C)
MINIMUM INSERTION LOSS:
About 12.5 dB, calibration furnished
MAXIMUM INPUT POWER LEVEL:
+20 dBm for specified accuracy
RESOLUTION:
0.001 dB Direct reading digital indicator

INPUT AND OUTPUT VSWR:
1.20 maximum at 1.25 MHz or 30.0 MHz in 50 Ohm system
DRIVE RESOLUTION (APPROXIMATELY):
Coarse: 29 dB/revolution
Fine : 0.15 dB/revolution, with 2 dB minimum range
CONNECTORS:
Two female Type-N, panel mounted
POWER:
100/120/220/240 Vac ±10%, 50 to 440 Hz, 15VA
DIMENSIONS:

BOX; wood	8.5 in.	(21.6 cm) high
	20.0 in.	(50.8 cm) wide
Incl. Cover	13.0 in.	(33.0 cm) deep
Without Cover	10.5 in.	(26.7 cm) deep
(Note: Cover removable on slip hinges)		
RACK MOUNT	7.0 in.	(17.8 cm) high
	19.0 in.	(48.3 cm) wide
	10.0 in.	(25.4 cm) deep

WEIGHT: Net, 42 lbs.; Shipping 50 lbs.

CALIBRATION

With each SPA-2, we furnish calibrations for input and output VSWR and variation of insertion loss with frequency from 29.0 to 31.0 MHz. A calibration for the deviation from linearity over the first 20 dB is furnished at 30.0 MHz. The following graphs present typical calibrations. For the SPA-3, equivalent data are furnished for 1.25 MHz.

Specifications subject to change without notice.

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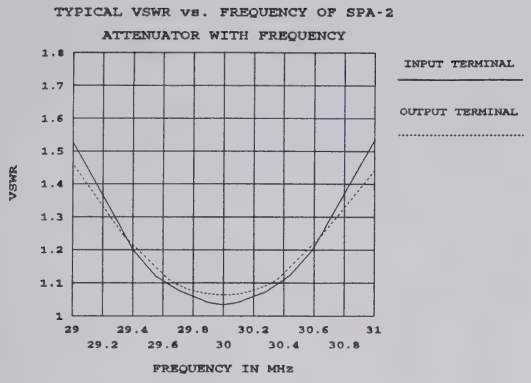

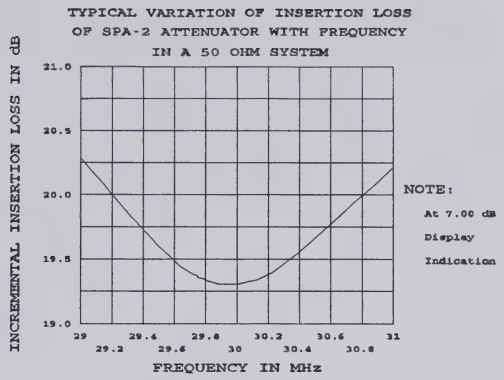

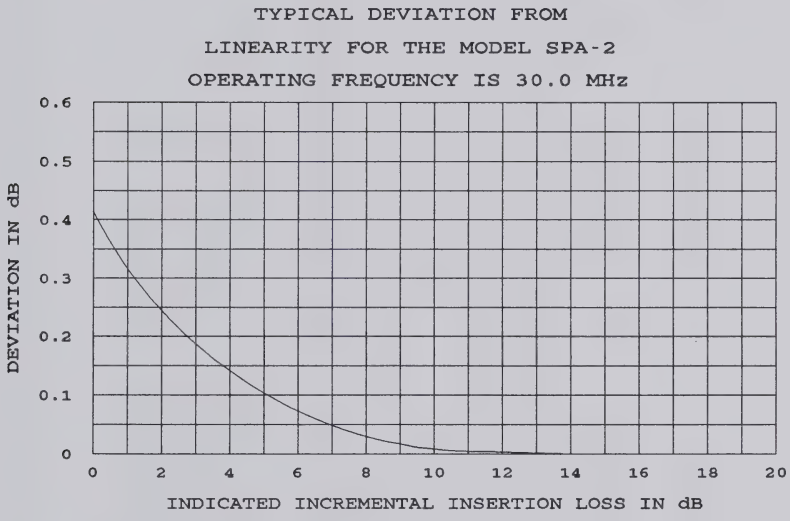

NOTE: Typical calibrations for the SPA-3 at 1.25 MHz are quite similar.

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CONVERSION CHART

$|\Gamma| = \frac{VSWR - 1}{VSWR + 1}$ = Reflection Coefficient (Scalar)

$20 \log_{10} |\Gamma|$ = Return Loss in dB

$1 - \Gamma^2$ = Ratio of Incident Power Transmitted

$10 \log_{10} [1 - \Gamma^2]$ = Reflection Loss Due to VSWR in dB

VSWR	Return Loss (dB)	$\|\Gamma\|$	Power Transmission $1 - \Gamma^2$	Reflected Power (dB)	VSWR	Return Loss (dB)	$\|\Gamma\|$	Power Transmission $1 - \Gamma^2$	Reflected Power (dB)
1.00	∞	.0000	1.00000	.0000	1.55	13.32	.2157	.95348	.2069
1.01	46.06	.0050	.99998	.0001	1.60	12.74	.2308	.94675	.2377
1.02	40.09	.0099	.99990	.0004	1.65	12.21	.2453	.93984	.2695
1.03	36.61	.0148	.99978	.0009	1.70	11.73	.2593	.93278	.3022
1.04	34.15	.0196	.99962	.0017	1.75	11.29	.2727	.92562	.3357
1.05	32.26	.0244	.99941	.0026	1.80	10.88	.2857	.91837	.3698
1.06	30.71	.0291	.99915	.0037	1.85	10.51	.2982	.91105	.4046
1.07	29.42	.0338	.99886	.0050	1.90	10.16	.3103	.90369	.4398
1.08	28.30	.0385	.99852	.0064	1.95	9.84	.3220	.89629	.4755
1.09	27.32	.0431	.99815	.0081	2.00	9.54	.3333	.88889	.5115
1.10	26.44	.0476	.99773	.0099	2.05	9.26	.3443	.88148	.5479
1.11	25.66	.0521	.99728	.0118	2.10	9.00	.3548	.87409	.5844
1.12	24.94	.0566	.99680	.0139	2.15	8.75	.3651	.86672	.6212
1.13	24.29	.0610	.99627	.0162	2.20	8.52	.3750	.85938	.6582
1.14	23.69	.0654	.99572	.0186	2.25	8.30	.3846	.85207	.6952
1.15	23.13	.0698	.99513	.0212	2.30	8.09	.3939	.84481	.7324
1.16	22.61	.0741	.99451	.0239	2.35	7.89	.4030	.83760	.7696
1.17	22.12	.0783	.99386	.0267	2.40	7.71	.4118	.83045	.8069
1.18	21.66	.0826	.99318	.0297	2.45	7.53	.4203	.82336	.8441
1.19	21.23	.0868	.99247	.0328	2.50	7.36	.4286	.81633	.8814
1.20	20.83	.0909	.99174	.0360	2.55	7.20	.4366	.80936	.9186
1.21	20.44	.0950	.99097	.0394	2.60	7.04	.4444	.80247	.9557
1.22	20.08	.0991	.99018	.0429	2.65	6.90	.4521	.79565	.9928
1.23	19.73	.1031	.98936	.0464	2.70	6.76	.4595	.78890	1.0298
1.24	19.40	.1071	.98852	.0501	2.75	6.62	.4667	.78222	1.0667
1.25	19.08	.1111	.98765	.0540	2.80	6.49	.4737	.77562	1.1035
1.26	18.78	.1150	.98676	.0579	2.85	6.37	.4805	.76910	1.1402
1.27	18.49	.1189	.98585	.0619	2.90	6.25	.4872	.76266	1.1767
1.28	18.22	.1228	.98492	.0660	2.95	6.13	.4937	.75629	1.2131
1.29	17.95	.1266	.98396	.0702	3.00	6.02	.5000	.75000	1.2494
1.30	17.69	.1304	.98299	.0745	3.05	5.91	.5062	.74379	1.2855
1.31	17.45	.1342	.98199	.0789	3.10	5.81	.5122	.73766	1.3215
1.32	17.21	.1379	.98098	.0834	3.15	5.71	.5181	.73160	1.3573
1.33	16.98	.1416	.97994	.0880	3.20	5.62	.5238	.72562	1.3929
1.34	16.75	.1453	.97889	.0927	3.25	5.52	.5294	.71972	1.4283
1.35	16.54	.1489	.97782	.0974	3.30	5.43	.5349	.71390	1.4636
1.36	16.33	.1525	.97673	.1023	3.35	5.35	.5402	.70815	1.4987
1.37	16.13	.1561	.97563	.1072	3.40	5.26	.5455	.70248	1.5337
1.38	15.94	.1597	.97451	.1121	3.45	5.18	.5506	.69688	1.5684
1.39	15.75	.1632	.97337	.1172	3.50	5.11	.5556	.69136	1.6030
1.40	15.56	.1667	.97222	.1223	3.55	5.03	.5604	.68591	1.6373
1.41	15.38	.1701	.97106	.1275	3.60	4.96	.5652	.68053	1.6715
1.42	15.21	.1736	.96988	.1328	3.65	4.88	.5699	.67522	1.7055
1.43	15.04	.1770	.96869	.1382	3.70	4.81	.5745	.66999	1.7393
1.44	14.88	.1803	.96748	.1436	3.75	4.75	.5789	.66482	1.7730
1.45	14.72	.1837	.96626	.1490	3.80	4.68	.5833	.65972	1.8064
1.46	14.56	.1870	.96503	.1546	3.85	4.62	.5876	.65469	1.8396
1.47	14.41	.1903	.96379	.1602	3.90	4.56	.5918	.64973	1.8727
1.48	14.26	.1935	.96254	.1658	3.95	4.50	.5960	.64483	1.9055
1.49	14.12	.1968	.96127	.1715	4.00	4.44	.6000	.64000	1.9382
1.50	13.98	.2000	.96000	.1773					

CONVERSION CHART

dB	Power Ratio	dB	Power Ratio	dB	Power Ratio	dB	Power Ratio
0	**1.000**	**5.0**	**3.162**	**10.0**	**10.000**	**16.0**	**39.81**
.1	1.023	5.1	3.236	10.1	10.23	16.1	40.74
.2	1.047	5.2	3.311	10.2	10.47	16.2	41.69
.3	1.072	5.3	3.388	10.3	10.72	16.3	42.66
.4	1.096	5.4	3.467	10.4	10.96	16.4	43.65
.5	1.122	5.5	3.548	10.5	11.22	16.5	44.67
.6	1.148	5.6	3.631	10.6	11.48	16.6	45.71
.7	1.175	5.7	3.715	10.7	11.75	16.7	46.77
.8	1.202	5.8	3.802	10.8	12.02	16.8	47.86
.9	1.230	5.9	3.890	10.9	12.30	16.9	48.98
1.0	**1.259**	**6.0**	**3.981**	**11.0**	**12.59**	**17.0**	**50.12**
1.1	1.288	6.1	4.074	11.1	12.88	17.1	51.29
1.2	1.318	6.2	4.169	11.2	13.18	17.2	52.48
1.3	1.349	6.3	4.266	11.3	13.49	17.3	53.70
1.4	1.380	6.4	4.365	11.4	13.80	17.4	54.95
1.5	1.413	6.5	4.467	11.5	14.13	17.5	56.23
1.6	1.445	6.6	4.571	11.6	14.45	17.6	57.54
1.7	1.479	6.7	4.677	11.7	14.79	17.7	58.88
1.8	1.514	6.8	4.786	11.8	15.14	17.8	60.26
1.9	1.549	6.9	4.898	11.9	15.49	17.9	61.66
2.0	**1.585**	**7.0**	**5.012**	**12.0**	**15.85**	**18.0**	**63.10**
2.1	1.622	7.1	5.129	12.1	16.22	18.1	64.57
2.2	1.660	7.2	5.248	12.2	16.60	18.2	66.07
2.3	1.698	7.3	5.370	12.3	16.98	18.3	67.61
2.4	1.738	7.4	5.495	12.4	17.38	18.4	69.18
2.5	1.778	7.5	5.623	12.5	17.78	18.5	70.79
2.6	1.820	7.6	5.754	12.6	18.20	18.6	72.44
2.7	1.862	7.7	5.888	12.7	18.62	18.7	74.13
2.8	1.905	7.8	6.026	12.8	19.05	18.8	75.86
2.9	1.950	7.9	6.166	12.9	19.50	18.9	77.62
3.0	**1.995**	**8.0**	**6.310**	**13.0**	**19.95**	**19.0**	**79.43**
3.1	2.042	8.1	6.457	13.1	20.42	19.1	81.28
3.2	2.089	8.2	6.607	13.2	20.89	19.2	83.18
3.3	2.138	8.3	6.761	13.3	21.38	19.3	85.11
3.4	2.188	8.4	6.918	13.4	21.88	19.4	87.10
3.5	2.239	8.5	7.079	13.5	22.39	19.5	89.13
3.6	2.291	8.6	7.244	13.6	22.91	19.6	91.20
3.7	2.344	8.7	7.413	13.7	23.44	19.7	93.33
3.8	2.399	8.8	7.586	13.8	23.99	19.8	95.50
3.9	2.455	8.9	7.762	13.9	24.55	19.9	97.72
4.0	**2.512**	**9.0**	**7.943**	**14.0**	**25.12**	**20.0**	**100.00**
4.1	2.570	9.1	8.128	14.1	25.70		
4.2	2.630	9.2	8.318	14.2	26.30		
4.3	2.692	9.3	8.511	14.3	26.92		
4.4	2.754	9.4	8.710	14.4	27.54		
4.5	2.818	9.5	8.913	14.5	28.18		
4.6	2.884	9.6	9.120	14.6	28.84		
4.7	2.951	9.7	9.333	14.7	29.51		
4.8	3.020	9.8	9.550	14.8	30.20		
4.9	3.090	9.9	9.772	14.9	30.90		
				15.0	**31.62**	**10**	**10**
				15.1	32.36	20	10^2
				15.2	33.11	30	10^3
				15.3	33.88	40	10^4
				15.4	34.67	50	10^5
						60	10^6
				15.5	35.48	70	10^7
				15.6	36.31	80	10^8
				15.7	37.15	90	10^9
				15.8	38.02	**100**	10^{10}
				15.9	38.90		

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Phone & FAX: (918) 457-4888

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FAX: (716) 359-3438

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FAX: (61-2) 748-1836

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(See Germany)

BELGIUM
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FAX: (32-11) 525777

FRANCE
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Z.I. Centre, BP No. 31
Buc 78530

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An den Eichen 22
D-3107 Hambuhren
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FAX: (05143) 2832

SchillerstraBe 5
D-7159 Auenwald 3
Tel: (07191) 56379
FAX: (07191) 56380

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Chinar Heights (Canara Bank Bldg.)
Deep Bungalow Chowk, Model Company
Pune 411016
Tel: (91) 212-347677
FAX: (91) 212-337398

NETHERLANDS
Heyen BV
Postbus 10, 6590 AA Gennep
Steendalerstraat 56
Tel: (31-8851) 96-111
FAX: (31-8851) 96-200

SWITZERLAND
EMCO Elektronic GmbH
(See Germany)

TAIWAN
Electronic Tech. Corp.
3rd Floor, #180
Sec. 2 Min-Sheng B. Road
Tel: 011-886-2-507-0222
FAX: 011-886-2-504-2183

U.K.
BFI-IBEXSA Electronics Ltd.
BFI-IBEXSA House
Burnt Ash Road
Quarry Wood Estate
Aylesford, Kent
Tel: (44-6) 22 88 24 67
FAX: (44-6) 22 88 24 69

WEINSCHEL ASSOCIATES

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BRUNO O. WEINSCHEL
REGISTERED PROF. ENGR.
M.D. No. 3174
D.C. No. 1042

April 7, 1993

Mr. Phil Accardi
U T Photonics
1289 Blue Hills Ave.
Bloomfield, CT 06002

Subj: Microwave Component and Instrument Catalog

Dear Mr. Accardi:

Enclosed is the catalog containing information on our current product line you requested in reply to our listing in the Microwaves & RF periodical.

Our representative for Connecticut is:

Mr. Maurice Polayes
Addelco Corp.
20 Freeman Place
Needham, MA 02192
Tel: (617) 444-4754
Fax: (617) 455-8274

Thank you for your interest. Should you require further technical, price or delivery information, please contact us or the sales representative for your area.

Yours very truly,

Regina Reese

Regina Reese
Secretary

encl
cc: Mr. Maurice Polayes

Microwave/R.F. Coaxial Components and Calibration Equipment From Weinschel Associates.

Bruno O. Weinschel and Associates designed and manufactured since 1952 passive coaxial microwave devices and calibration equipment. They extended the product performance range formerly made by Weinschel Engineering.

Fixed Attenuators

GHz	Conn.	dB	AVE/PK	Model
0-3	N	1-50	1W/1KW	WA50
0.4-18	N	1-20	1W/1KW	210B
0-12.4	N	1-60	5W/1KW	WA1
0-18	PREC. N	1-60	5W/1KW	WA2
0-18	N	1-60	5W/1KW	WA44
0-8	N	3,6,10,20,30	25W/5KW	WA33
0-8	N	3,6,10,20,30	50W/5KW	WA24
0-18	N	3,6,10,20,30,40	25W/1KW	WA46
0-18	N	10,20,30	50W/1KW	WA47
0-18	N	20,30,40	100W/1KW	WA48
0-12.4	SMA	1-60	2W/.5KW	WA3
0-18	SMA	1-60	2W/.5KW	WA4
0-26.5	SMA	1-60	2W/.5KW	WA9
0-18	SMA	1-30	10W/1KW	WA41
0-18	7mm	1-60	5W/1KW	WA17
2-40	2.92mm*	3,6,10,20	1W/50W	240
4-40	2.92mm*	3,6,10	.5W/50W	440
8-40	2.92mm*	3,6,10,20	.5W/50W	840
0-40	2.92mm*	3,6,10,20,30	2W/.2KW	WA54

Attenuator Sets

GHz	Conn.	dB	AVE/PK	Model
0-18	N	3,6,10,20	5W/1KW	WAS6
0-18	7mm	1,3,6,10,20,30	5W/1KW	WAS16
0-18	PREC. N	1,3,6,10,20,30	5W/1KW	WAS18
0-26	SMA	1,3,6,10,20	2W/.5KW	WAS19

Continuously Variable Attenuators

GHz	Connector	dB	AVE/PK	Model
0-2	Type N,SMA	100	5W/.5KW	VA/02/100
0-4	Type N,SMA	60	5W/.5KW	VA/04/60
1-18	Type N	3,10,20	5W/1KW	953B
1-40	2.92mm*	3,10,20	2W/.5KW	953K

Step Attenuators, SMA, 2W/200W

GHz	dB/Steps	0-9/1	0-60/10	0-90/10
0-4	WAC	9009	9010	9011
0-8	WAD	9009	9010	9011
0-12.4	WAE	9009	9010	9011
0-18	WAF	9009	9010	9011

Resistive Power Splitter

GHz	Conn.	dB	AVE/PK	Model
0-18	N	6	1W/1KW	PS-018
0-18	7mm	6	1W/1KW	7PS-018

Terminations

GHz	Conn.	AVE/PK	Model
0-8	N	50W/5KW	WA1426
0-18	SMA	10W/1KW	WA1419
8-40	2.92mm*	1W/50W	WAT40

Coaxial Slotted Lines

Freq. GHz	Connector	Model
2-18	N,7mm	SL1024
2-18	Carriage	SL1024-Z
2-18	Prb. Det. Assy.	SL1024-Y

Precision Piston Attenuators

Freq. MHz	Resolution dB	Incremental Range dB	Model
30.0	0.001 (digital)	0-120	SPA-2
1.25	0.001 (digital)	0-120	SPA-3
1.25/30.0	0.0001 (digital)	0-120	PA-4B

Double Stub Tuners

(GHz)	Connector	Model
.75-13	N	DS-109
.4-4	N	DS-109L
.2-2	N	DS-109LL
.04-.4	N	DS-109H

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*Mates with SMA, APC-3.5, Wiltron Type K.

APC-3.5 is a trademark of Amphenol Corp.
K connectors is a registered trademark of Wiltron Co.

Microwave/R.F. Coaxial Components and Calibration Equipment From Weinschel Associates.

Bruno O. Weinschel and Associates designed and manufactured since 1952 passive coaxial microwave devices and calibration equipment. They extended the product performance range formerly made by Weinschel Engineering.

Fixed Attenuators

GHz	Conn.	dB	AVE/PK	Model
0-3	N	1-50	1W/1KW	WA50
0.4-18	N	1-20	1W/1KW	210B
0-12.4	N	1-60	5W/1KW	WA1
0-18	PREC. N	1-60	5W/1KW	WA2
0-18	N	1-60	5W/1KW	WA44
0-8	N	3,6,10,20,30	25W/5KW	WA33
0-8	N	3,6,10,20,30	50W/5KW	WA24
0-18	N	3,6,10,20,30,40	25W/1KW	WA46
0-18	N	10,20,30	50W/1KW	WA47
0-18	N	20,30,40	100W/1KW	WA48
0-12.4	SMA	1-60	2W/.5KW	WA3
0-18	SMA	1-60	2W/.5KW	WA4
0-26.5	SMA	1-60	2W/.5KW	WA9
0-18	SMA	1-30	10W/1KW	WA41
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Attenuator Sets

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0-18	7mm	1,3,6,10,20,30	5W/1KW	WAS16
0-18	PREC. N	1,3,6,10,20,30	5W/1KW	WAS18
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